

# THE MIOCENE GASTROPOD FAUNA OF MARYLAND

A DISSERTATION

PRESENTED TO THE BOARD OF UNIVERSITY STUDIES  
OF THE JOHNS HOPKINS UNIVERSITY FOR THE  
DEGREE OF DOCTOR OF PHILOSOPHY

BY  
GEORGE CURTIS MARTIN  
1901

---

BALTIMORE, MD.  
DECEMBER, 1904

---

---







# THE MIOCENE GASTROPOD FAUNA OF MARYLAND

A DISSERTATION

PRESENTED TO THE BOARD OF UNIVERSITY STUDIES  
OF THE JOHNS HOPKINS UNIVERSITY FOR THE  
DEGREE OF DOCTOR OF PHILOSOPHY

BY  
GEORGE CURTIS MARTIN  
1901



---

BALTIMORE, MD.  
DECEMBER, 1904



*The Friedenwald Company*  
BALTIMORE, MD., U. S. A.

Reprinted from

MARYLAND GEOLOGICAL SURVEY, MIOCENE, pp. 130-274.



## PREFACE

This paper is the result of a series of studies of the stratigraphy and paleontology of the Atlantic Coast Tertiary which have been continued by the writer for the last four years. During the summer of 1897 the writer spent about two months in measuring sections and collecting fossils in the Tertiary of Maryland and Virginia. During the following winter the fossils thus obtained were identified, a careful study of the literature made, and a card catalogue prepared which contains every reference to invertebrate fossils from the Upper Oligocene, Miocene and Pliocene of the eastern United States. Emmons' types from North Carolina (which are generally supposed to have been destroyed during the Civil War) were discovered at Williams College, Williamstown, Massachusetts, and were carefully studied. During the next summer the Miocene of New Jersey and of Maryland and the Miocene and Pliocene of Virginia, North Carolina and South Carolina were studied in the field. From September, 1898, until the present a special study has been made of that portion of the Tertiary fauna which is here described. This study has been based upon: (1) all the material collected by the Department of Geology in this institution during the last fourteen years; (2) the Maryland material collected by the writer before entering this University; (3) all the material in the Philadelphia Academy of Natural Sciences, including Conrad's, Lea's, Gabb's, Heilprin's and Whitfield's types; (4) a large amount of undescribed material from southern Maryland collected by Mr. Joseph Willcox and Mr. C. W. Johnson in 1889 and 1890, and now preserved in the Wagner Free Institute of Science of Philadelphia, and the types described by William Wagner and still preserved in the same institution; (5) the Emmons type collection referred to above, and some Maryland fossils in the same collection; (6) all the material in the U. S. National Museum, including Dr. Dall's types, Whitfield's types from the Miocene of New Jersey, and a large amount



of undescribed material from Maryland collected by Professor Harris and Mr. Burns in 1891 and 1892 and by Mr. Burns in 1899; (7) the material in the museum of the Maryland Academy of Sciences; (8) special collections made by the Maryland Geological Survey during the progress of this work.

Thanks are due to the president and curators of the Philadelphia Academy of Science, Professor G. D. Harris, of Cornell University; Dr. W. H. Dall, of the U. S. National Museum, and Professor T. N. Dale, of Williams College, for access to the collections and loan of fossils. Dr. Dall, Dr. H. A. Pilsbry, Mr. C. W. Johnson and Professor Harris have been very ready with advice and assistance and have done much to encourage the work. Especial thanks are due to Professor William B. Clark, under whose personal direction the work has been carried on during the past three years and to whose aid in the advice and assistance which he has given, the early completion of the work and whatever value it may possess are due.

*May, 1901.*

## CLASS GASTEROPODA.

## Subclass EUTHYNEURA.

## Order OPISTHOBRANCHIATA.

## Suborder TECTIBRANCHIATA.

## Family ACTÆONIDÆ.

## Genus ACTÆON Montfort.

## ACTÆON OVOIDES Conrad.

## Plate XXXIX, Fig. 2.

*Acteon ovoides* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 227, pl. ix, fig. 24.

*Actæon ovoides* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 186.

*Actæon ovoides* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Actæon ovoides* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 13.

*Tornatella ovoides* Meyer, 1888, Proc. Acad. Nat. Sci. Phila., vol. xl, p. 170.

*Actæon ovoides* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 28. Not *Actæon ovoides* Whitfield (*A. ovoidea* Gabb) = *Avellana ovoidea*.

*Description*.—"Shell ovate, smooth, polished, transversely striated; spire short and conical; aperture more than half the length of the shell; suture deeply impressed. The striae are about twenty in number on the large whorl, and are impressed; the aperture is long and moderately wide, and the fold large." Conrad, 1830.

The shell is oblong-ovate, the most slender of our Maryland Actæons. The revolving lines alternate in strength, extend quite to the suture, and are punctate. There are sometimes as many as thirty revolving lines on the body whorl, and usually eight or ten on the earlier whorls.

Length, 10.5 mm.; diameter, 5.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, St. Mary's River, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), Greensboro. CALVERT FORMATION. Church Hill, Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University, Wagner Free Institute of Science.



## ACTÆON PUSILLUS (Forbes).

Plate XXXIX, Fig. 3.

*Tornatella pusilla* Forbes, 1843, Rep. Brit. Assoc. Adv. Sci., p. 191.

*Description*.—"Shell ovate-globose, whitish; whorls 4, regularly and deeply punctate-striate; aperture oblong. Length 4, breadth 2 mm." Forbes, 1843.

This species does not seem to have ever been figured, and until authentic specimens have been seen the identification cannot be certain. The essential characters of the Maryland specimens are a short ovate-globose shell with a much depressed spire and with uniform, distant, regularly spaced revolving lines with faint punctæ.

Length, 4.5 mm.; diameter, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## ACTÆON SHILOHENSIS Whitfield.

Plate XXXIX, Fig. 4.

*Actæon punctostriatus* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 14. (In part.)

*Actæon Shilohensis* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 137, pl. xxiv, figs. 15-17.

*Description*.—"Shell of about medium size, subglobular or broadly ovate, the transverse diameter being to the height about as three to five; spire short, the apical angle about 70 degrees. Volutions six, short in the spire, abruptly rounded on the top, giving an almost impressed suture line, and presenting a step-like appearance to the spire, rounded and full below; aperture moderately large, somewhat effuse below, the outer lip sharp; columella short and the fold very distinct and defined. Surface polished, with nearly equidistant impressed lines, except on the upper third of the height or on the exposed portion in the spire, where they are obsolete; lines generally clean, or free from punctæ or dots. Some of the interspaces on the lower part of the volution marked by an intermediate finer line.

"This species differs from several forms known in the Eocene forma-

tion in being more globular, and in having a shorter spire." Whitfield, 1894.

The specimens here referred to this species may be characterized as follows:

Shell twice as long as broad; mouth one-half the length of the shell; spire one-third the length of the shell; spire turreted, the later whorls regularly increasing in height; surface polished; lines of growth faint, slightly but uniformly convex toward the mouth; impressed revolving lines increasing in width and proximity toward the base of the whorl, with an intermediate revolving line most prominent in the middle of the whorl, principal revolving lines strongly punctate because of narrow raised longitudinal lines (of growth?) which cross them.

The essential characteristics are that the striae are alternate and are obsolete above the middle of the whorl. It differs from *A. punctostriatus* in being larger, more slender, and in having a larger part of the surface covered with the revolving striae.

The type of *A. shilohensis* has a strongly turreted spire and no punctae in the revolving striae. If this is constant it makes the species distinct.

*Actæon semistriatus* Férussac has a strong resemblance to this form and is possibly identical with it. If so, Férussac's name will have priority. This question cannot be decided without authentic specimens.

Length, 10.5 mm.; diameter, 5.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, Langley's Bluff. CALVERT FORMATION. Plum Point, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

#### ACTÆON CALVERTENSIS n. sp.

Plate XXXIX, Fig. 5.

*Description*.—Shell small, ovate and somewhat globose, loosely coiled, almost umbilicate, five-whorled; body whorl with about fourteen broad, almost flat, revolving ribs with narrower deeply-set grooves between them; lines of growth distinct and regular; surface polished.

Length, 4.5 mm.; diameter, 3 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Cornell University.



## Family TORNATINIDÆ.

Genus VOLVULA Adams.

## VOLVULA IOTA (Conrad).

Plate XXXIX, Figs. 6, 7, 8, 9.

*Bulla acuminata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 210.*Bulla acuminata* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 186.*Ovula iota* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 309.*Amphiceras iota* Conrad, 1854, Proc. Acad. Nat. Sci. Phila., vol. vii, p. 31.*Volvula iota* ? Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xiv, p. 24.Not *Volvula acuminata* Sowerby.

*Description*.—"Narrow-elliptical, with minute spiral lines towards the base; inner margin regularly arched above the middle of the shell, where the aperture is very narrow, widening a little towards the apex; aperture gradually expanding from the middle to the base; labrum very slightly rounded; labium reflected. Length, quarter of an inch." Conrad, 1843.

There are four varieties of *Volvula* in the Miocene of Maryland, some or all of which may be entitled to specific rank. It is very doubtful to which of these varieties Conrad intended the name *iota* to be applied. The original specimens came from Plum Point.

## VOLVULA IOTA VAR. MARYLANDICA n. var.

Plate XXXIX, Fig. 6.

This is the form which Conrad referred to *acuminata*. It differs from the *acuminata* of the European authors in lacking a columella fold, and in being less elongate. It is distinguished from our other varieties by its sharp spire.

Length, 2.5 mm.; diameter, 1 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Paw Paw Point. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## VOLVULA IOTA VAR. DIMINUTA n. var.

Plate XXXIX, Fig. 7.

This form is long and slender and has a blunt spire. It is cylindrical and of nearly uniform diameter. It is to this form that Conrad applied the catalogue name "*diminuta*."

Length, 4.7 mm.; diameter, 1.8 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

VOLVULA IOTA VAR. CALVERTA n. var.

Plate XXXIX, Fig. 8.

This form also is cylindrical but differs from *var. diminuta* in being of much greater proportional diameter.

Length, 3.5 mm.; diameter, 1.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

VOLVULA IOTA VAR. PATUXENTIA n. var.

Plate XXXIX, Fig. 9.

This form is somewhat shorter proportionally than *diminuta* and also differs from it in being much wider below than above. The sides are nowhere flat in profile but are gently rounded throughout.

In the National Museum are specimens from Duplin Co., N. C., which are identical with this variety, and which are labeled *V. oxytata* Bush. I have not seen authentic specimens of that species, but from the figures this would not seem to be the typical form.

Length, 5.5 mm.; diameter, 2 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run, 2 miles south of Governor Run.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University.

Genus RETUSA Brown.

Subgenus CYLICHNINA Monterosato.

RETUSA (CYLICHNINA) MARYLANDICA n. sp.

Plate XXXIX, Fig. 10.

*Description*.—Shell small, nearly cylindrical, slightly smaller at the apex and with a suggestion of a constriction in the middle; surface



covered with fine crowded longitudinal lines. This species resembles *Retusa sulcata* but is not as slender as that species.

Length, 3.5 mm.; diameter, 1.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, U. S. National Museum.

#### RETUSA (CYLICHNINA) CONULUS (Deshayes).

Plate XXXIX, Fig. 11.

*Bulla conulus* Deshayes, 1824, Desc. Coquilles Fossiles des Env. de Paris, vol. ii, p. 41, pl. v, figs. 34-36.

*Description*.—"Testâ ovato-conicâ, basi tenuissimè striatâ; columellâ subuniplicatâ, aperturâ supernè angustissimâ, basi dilatâtâ; spirâ inclusâ, minimè perforatâ.

"Sa forme conique, son ouverture très-étroite, sa columelle marginée et qui offre un pli presque complet, sa petitesse, la finesse de ses stries et sa lèvre droite un peu sinueuse et souvent épaissie, sont de très-bons caractères. Les plus grands individus sont longs de cinq à six millimètres et larges de deux et demi à la base." Deshayes, 1824.

This is the first recognition of the occurrence of this widely distributed European Tertiary species on this side of the Atlantic.

Length, 5 mm.; diameter, 2 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Church Hill, Centreville Well at depth of 170 feet.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, U. S. National Museum.

#### RETUSA (CYLICHNINA) SUBSPISSA (Conrad).

Plate XXXIX, Fig. 12.

*Bulla subspissa* Conrad, 1848, Proc. Acad. Nat. Sci. Phila., vol. iii, p. 20, pl. i, fig. 29.

*Bulla subspissa* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 571.

*Bulla subspissa* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 13.

*Description*.—"Oblong-oval, thick, ventricose in the middle; labium rounded or ventricose; margin of labrum straight above; base minutely umbilicated." Conrad, 1848.

This form is very rare. Perhaps it should be called a variety of *C. conulus*, to which it is most nearly related.

Length, 4 mm.; diameter, 2.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Cornell University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

### Family SCAPHANDRIDAE.

Genus CYLICHNA Loven.

CYLICHNA (?) GREENSBOROËNSIS n. sp.

Plate XXXIX, Fig. 13.

*Description*.—Small, slender, tapering anteriorly, surface everywhere non-cylindrical; sculpture absent; mouth widest below.

There is a specimen in the National Museum from Plum Point which apparently belongs to this species.

Length, 3.5 mm.; diameter, 1.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro. CALVERT FORMATION (?). Plum Point (?).

*Collections*.—Maryland Geological Survey, U. S. National Museum.

CYLICHNA CALVERTENSIS n. sp.

Plate XXXIX, Figs. 14, 15.

*Description*.—Shell small, cylindrical, without sculpture; spire hidden; spiral end nearly flat; proportional length variable.

Length, 3 mm.; diameter, 1.3 to 1.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, U. S. National Museum.



Subclass STREPTONEURA.  
 Order CTENOBRANCHIATA.  
 Suborder ORTHODONTA.  
 Superfamily TOXOGLOSSA.

Family TEREBRIDÆ.

Genus TEREBRA Adanson.

TEREBRA UNILINEATA Conrad.

Plate XL, Figs. 1-2.

*Cerithium unilineatum* Conrad, 1841, Amer. Jour. Sci., vol. xli, p. 345, pl. ii, fig. 4.

*Cerithium unilineatum* Conrad, 1843, Trans. Assoc. Amer. Geol. and Nat., p. 108, pl. v, fig. 4.

*Acus unilineata* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 137, pl. xxviii, fig. 7.

*Terebra unilineata* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 258, fig. 129.

*Terebra (Acus) unilineata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Description*.—"Slightly turrited; volutions with each a spiral impressed line above the middle; space between this line and suture with oblique plicæ." Conrad, 1841.

"Shell thick, elongate bands alternate, acute, tapering gradually to a point; whirls many, seventeen or eighteen, and ornamented by revolving impressed lines, and passing just above the middle of the whirl; the upper part of the spire is also marked by short longitudinal ribs, which are interrupted by spiral lines. Oblique lines of growth are usually conspicuous. In old specimens, the ribs are obsolete." Emmons, 1858.

The body whorl of Emmons' figured specimen is proportionately longer than indicated in his figure.

We have a single fragment, the body whorl and part of the next. The sculpture is somewhat obsolete.

Length of fragment, 22 mm.; diameter, 13 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

Subgenus ACUS Adams.

TEREBRA (ACUS) CURVILINEATA Dall.

Plate XL, Figs. 3, 4, 5, 6, 7.

*Terebra curvilirata* Heilprin, 1887, Proc. Acad. Nat. Sci. Phila., vol. xxxix, p. 399.

*Terebra simplex*, small var. Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Terebra curvilineata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 113, pl. xx, figs. 14-17. (In part.)

*Terebra (Acus) curvilineata* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii, p. 36.

Not *Terebra (Acus) curvilineata* Meek.

*Description*.—"Shell acute-conic, solid, with 12 to 14 moderately convex whorls; early whorls more flatsided, with numerous narrow, transverse, slightly waved riblets extending from suture to suture, with about equal interspaces; suture very distinct; sutural band formed by a vaguely limited constriction, not a groove; a short distance in front of the suture the ends of the ribs thus delimited from the rest have a tendency to coronate the whorl; on the later whorls the ribs become less regular and somewhat less prominent; aperture longer than wide; outer lip simple; pillar elongated, twisted, smooth; siphonal fasciole very distinct. Longitude, 27; maximum diameter, 9.5 mm. in a specimen of 14 whorls." Dall, 1895.

The range of variation covered by Dr. Dall's type specimens (which include Whitfield's) and by his description is very considerable and several varieties may safely be recognized.

The name "*Terebra curvilineata*" first appeared as the result of a misprint, being used by Meek in his "Check List" for *T. curvilirata* Conrad. Whitfield then used the name for the New Jersey forms, ignorant both that Conrad's name was not "*curvilineata*" and that his own specimens were not the same as Conrad's. Whitfield's specimens belong to the varieties *whitfieldi* and *dalli* as here established. Heilprin had already listed the New Jersey forms as *curvilirata* Conrad. A year after Whitfield's paper appeared Dall described the species *curvilineata* as new, basing it upon Whitfield's figured specimens together with material from Greensboro which is here placed in the variety *dalli*. Associated at Plum Point with the varieties above mentioned is a third, below named *calvertensis*, which is as closely related to *dalli* and *whitfieldi* as they are to each other.

The occurrence and further description is given below under each variety.

TEREBRA (ACUS) CURVILINEATA VAR. WHITFIELDI n. var.

Plate XL, Figs. 3, 4.

*Terebra curvilineata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, pl. xx, figs. 15-17.

*Description*.—Shell elongated, tapering slowly; whorls with a slight constriction below the suture (in the mature individuals) above which the longitudinal ribs are very slightly tuberculate. In the young shells the longitudinal ribs are continuous, without interruption or undulation, from suture to suture. Between the ribs are fine but sharp revolving striæ.

The young of this variety bears a very strong resemblance to *Terebra* (*Hastula*) *venusta* Lea, of the Claibornian Eocene, and probably *venusta* is the ancestral form. The resemblance is so close that if the characters did not change so much in the adult we would have to refer some of our young specimens to the Eocene species.

This variety occurs in the CALVERT FORMATION at Jericho, N. J., and is represented by figures 15 to 17 of Whitfield's report.

Length (of fragment), 16 mm.; diameter, 5.7 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

TEREBRA (ACUS) CURVILINEATA VAR. DALLI n. var.

Plate XL, Fig. 5.

*Terebra simplex*, small var. Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Terebra* (*Acus*) *curvilineata* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii. [No. 1035], p. 36. (In part.)

*Description*.—Shell acute; whorls flat-sided or very slightly convex; ribs becoming obsolete on the later whorls, usually continuous—never entirely cut by a subsutural band; a slight subsutural constriction is sometimes present, but it produces merely a slight undulation in the ribs; revolving lines extremely faint or entirely absent.

This variety includes all those forms referred by Dall to *curvilineata*



except the specimen with sharp revolving lines which Whitfield had previously figured as "figs. 15-17." This variety is probably the predecessor of *T. simplex*, to which it has a strong resemblance.

Length, 27 mm.; diameter, 9.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro, Jones Wharf, Sand Hill (?). CALVERT FORMATION. Plum Point, Church Hill, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

TEREBRA (ACUS) CURVILINEATA VAR. CALVERTENSIS n. var.

Plate XL, Figs. 6, 7.

*Description*.—Shell elongate, tapering slowly; whorls constricted about one-third of the way below the suture by a distinct groove above which the ribs are strongly tuberculate; ribs straight, regular, distant; no spiral sculpture.

Length (of fragment), 17 mm.; diameter, 5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

TEREBRA (ACUS) CURVILIRATA Conrad.

Plate XL, Fig. 8.

*Terebra curvilirata* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 327.

*Terebra curvilirata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Terebra (Acus) curvilineata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 18.

*Terebra curvilineata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 113. (In part.)

*Terebra (Acus) curvilirata* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii [No. 1035], p. 37.

Not *Terebra curvilirata* Heilprin.

*Description*.—"Subulate, whorls with a revolving impressed line below and near the suture; beneath this line the whorls are convex; ribs longitudinal, curved, acute, dislocated by the impressed line; revolving lines minute, crowded, obsolete; columella sinuous. Length one and a quarter inches.

"Differs from *Cerithium dislocatum*, Say, in wanting the distinct re-

volving lines, and the small dislocated portion of the ribs are not of a tubercular form; the aperture is longer and narrower." Conrad, 1843.

"The shell is small, not exceeding 30 mm. in length, with rather swollen whorls constricted narrowly above, much as in *Pleurotoma* of the section *Cymatosyrinx*. The ribs are about 12 to the whorl and most prominent at the periphery; their posterior ends are constricted off near the suture without any distinct groove or incised line; they are strongly curved in front of the constriction; the surface has extremely faint, obsolete spiral sculpture, only visible with the aid of a lens; the pillar thin, simple, and twisted, rather short; the nucleus is conical, of four smooth whorls like a small, very much elevated *Calliostoma*, except that the whorls are rounded. A specimen 15 mm. long had ten whorls, exclusive of the nucleus, and a maximum diameter of 4.75 mm." Dall, 1895.

Length, 27 mm.; diameter, 7 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Wagner Free Institute of Science, Cornell University.

#### TEREBRA (ACUS) SINCERA Dall.

Plate XL, Fig. 9.

*Terebra (Acus) sincera* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii [No. 1035], p. 37.

*Description*.—"Shell small, thin, acute-conic, flat-whorled, with feeble sculpture; whorls ten, without the nucleus; anterior half of the whorls, with fine, feeble, spiral threading overrunning the ribs, posterior half without spirals, but divided into two equal parts by a spiral groove visible between the ribs; transverse sculpture of fine, low, even, narrow, arched riblets, with wider interspaces, extending clear across the whorls; suture distinct, sutural band obscure, not swollen; aperture longer than wide, outer lip thin, arched in harmony with the ribs; pillar short, smooth, or faintly excavated; canal recurved, not contracted. Longitude, 22; maximum diameter, 5 mm.

"When superficially eroded the ribs are more prominent, as is the succeeding whorl at the suture, and the whorls may have a slightly turritid appearance." Dall, 1895.

This form is most closely related to *T. curvilirata*, from which it differs in lacking distinct subsutural tubercles and in possessing strong spiral threading.

Length, 22 mm.; diameter, 5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Wagner Free Institute of Science.

Subgenus HASTULA H. & A. Adams.

TEREBRA (HASTULA) SIMPLEX Conrad.

Plate XL, Fig. 10.

*Terebra simplex* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 226, pl. ix, fig. 22.

*Terebra simplex* Conrad, 1842, Proc. Nat. Inst., Bull. II, pp. 185, 187.

*Terebra simplex* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Terebra (Acus) simplex* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 18.

*Terebra (Subula) simplex* Conrad, 1868, Amer. Jour. Conch., vol. iv, p. 68, pl. v, fig. 5.

*Terebra simplex* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 28.

*Terebra simplex* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii [No. 1035], p. 34.

*Description*.—"Shell elongate conical, smooth, with plain undivided whorls; sides straight; the lines of growth are very distinct, and the large whorl slopes abruptly towards the base; the aperture is rather large." Conrad, 1830.

"Subulate; volutions 10 to 12, sides nearly straight, slightly depressed above the middle; on the whorls toward the apex this depression is more like an impressed line near the suture; lines of growth distinct and curved; body whorl rather abruptly rounded at base." Conrad, 1868.

Length, 45 mm.; diameter, 12 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Wagner Free Institute of Science, Cornell University.



## TEREBRA (HASTULA) SIMPLEX VAR. SUBLIRATA Conrad.

Plate XL, Fig. 11.

*Terebra subilirata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

(Name only.)

*Terebra (Acus) subilirata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 18.

*Description.*—General form like *simplex*; suture more distinct; whorls somewhat turreted; faint longitudinal lirations extend from suture to suture; an impressed subsutural line sometimes appears on the body whorl at about one-fourth the distance to the base.

Length, 38 mm.; diameter, 10 mm.

*Occurrence.*—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections.*—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

## TEREBRA (HASTULA) INORNATA Whitfield.

Plate XL, Figs. 12, 13.

*Terebra inornata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 114, pl. xx, figs. 11-13.*Terebra (Hastula) inornata* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii [No. 1035], p. 35.

*Description.*—"Shell below medium size and very slender, consisting of twelve or more volutions; spire attenuated; volutions sloping abruptly for about one-third of their exposed surface below the suture, below which point their sides are vertical, parallel, and destitute of ornamentation other than fine lines of growth, except on a few of the apical volutions; where, when perfect, there are faint vertical ridges; aperture narrow, elongate, forming about three-fifths of the height of the body volution at its margin; outer lip thin and sharp; columella twisted, slightly excavated on its face, and marked by a thickened spiral rib near the base; channel slight." Whitfield, 1894.

"Shell small, slender, nearly smooth, without any sutural band or spiral sculpture, and with about a dozen whorls; early whorls with a few obsolete transverse riblets, other whorls with no sculpture except the somewhat irregular incremental lines; whorls rather flat, suture distinct, closely oppressed; aperture longer than wide; outer lip thin; nearly

straight, simple; pillar short, simple, twisted; the canal moderately wide; base rounded, without a carina. Longitude, 18; maximum diameter, 4 mm." Dall, 1895.

This species does not occur at Shiloh, N. J., as Dr. Dall believed. Whitfield recorded his New Jersey specimens as from the Cape May well, where they are associated with other St. Mary's species.

Length, 21 mm.; diameter, 5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

TEREBRA (HASTULA) PATUXENTIA n. sp.

Plate XL, Fig. 14.

*Description*.—Shape like *inornata*, except that the sides of the whorls are flat. Entire shell covered with fine, close, distinct spiral lines. On the younger whorls are many narrow ribs running straight from suture to suture. On the lower whorls these become obsolete and irregular, remaining most distinct immediately below the suture.

Length (restored), 13 mm.; diameter, 3 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf.

*Collection*.—Maryland Geological Survey.

Family CONIDÆ.

Genus CONUS Linné.

CONUS DILUVIANUS Green.

Plate XL, Figs. 15, 16, 17.

*Conus Deluvianus* Green, 1830, Trans. Albany Institute, vol. i, p. 124.

*Conus diluvianus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Conus diluvianus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

Not *Conus diluvianus* Tuomey and Holmes or Emmons.

*Description*.—"Shell conical, and somewhat elongated; spire elevated and rather acute; whorls slightly grooved and concave; base of the columella slightly twisted inwards; length three inches and less than half

as broad. A few transverse impressed lines may be seen in the aperture. It has some resemblance to the *Marylandicus* but differs from that shell in the spire not being carinated; in the whorls being concave, and in the general contour of the shell." Green, 1830.

Length, 67 mm.; diameter, 33 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University.

#### CONUS MARYLANDICUS Green.

*Conus Marylandicus* Green, 1830, Trans. Albany Institute, vol. i, p. 124, pl. iii, fig. 2.

*Conus diluvianus* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 132, vol. xxvii, fig. 15.

*Conus diluvianus* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 263, fig. 143.

*Conus marylandicus* Dall, 1895, Proc. U. S. Nat. Museum, vol. xviii [No. 1035], p. 42.

*Description*.—"Shell conical, pyriform, with 8 or 10 deep grooves at the base. In some specimens, upon a very close examination, impressed transverse lines may be discovered on the upper half of the body whorl; spire elevated and acute; the whorls channeled and carinated on their lower edges: length an inch and a half, and half as broad." Green, 1830.

There is nothing further to indicate that this species occurs in Maryland.

#### Family PLEUROTOMIDÆ.

Genus PLEUROTOMA Lamarck.

Subgenus HEMIPLEUROTOMA Cossmann.

#### PLEUROTOMA (HEMIPLEUROTOMA) ALBIDA Perry.

Plate XLI, Fig. 1.

*Pleurotoma albida* Perry, 1811, Conch., expl. pl. xxxii, fig. 4.

*Pleurotoma albida* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 28, pl. iv, fig. 8a.

*Description*.—Shell elongate, eight-whorled, spire and beak attenuate, spire sloping uniformly from the shoulder of the body-whorl; each whorl



of the spire with one strong revolving rib in the center, with a secondary one on each side of it, and several intermediate ones between; body whorl with several ribs below those represented on the spire; notch on the shoulder (central rib), and marked rugose lines of growth.

Length (restored), 25 mm.; diameter, 8 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Dover Bridge.

*Collection*.—Maryland Geological Survey.

PLEUROTOMA (HEMIPLEUROTOMA) COMMUNIS Conrad.

Plate XLI, Figs. 2, 3.

*Pleurotoma communis* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 224, pl. ix, fig. 23.

*Pleurotoma communis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 186.

*Pleurotoma communis* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 264.

*Surcula communis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula communis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (188), p. 21.

*Pleurotoma communis* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 28.

*Description*.—"Shell subfusiform, smooth, with one obtuse carina revolving in the middle of each whorl, except the last, which has three; the lowest one obsolete; beak attenuated and slightly recurved.

"This is a numerous species of the locality at St. Mary's River." Conrad, 1830.

The sides of each whorl are straight or nearly so, and the medial carina is sharply elevated. The siphonal notch is not deep but is on the shoulder of the whorl.

Length, 25 mm.; diameter, 7 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

PLEUROTOMA (HEMIPLEUROTOMA) COMMUNIS VAR. PROTOCOMMUNIS  
n. var.

Plate XLI, Figs. 4, 5, 6.

*Description*.—Shell fusiform, elongate, of thick substance, nine-whorled; spire high; body whorl short, beak attenuate, straight; whorls

constricted at the suture and obtusely angular and sometimes carinated in the center; whorls with a minor carina at the suture and usually 8 or 10 revolving lines on each whorl of the spire; body whorl strongly striate.

Length, 33 mm.; diameter, 10 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Cornell University, U. S. National Museum.

PLEUROTOMA (HEMIPLEUROTOMA) CHOPTANKENSIS n. sp.

Plate XLI, Fig. 7.

*Description*.—Shell subfusiform, nine-whorled; whorls moderately convex with sometimes a subsutural band which is flat or concave; lines of growth strong, sometimes developing oblique costæ on the shoulder; notch moderately deep, situated at or slightly above the shoulder; surface polished, and with faint impressed spiral lines, with slightly convex interspaces, on the lower part of the body whorl; anterior canal of moderate length, slightly curved.

This species is very abundant at Jones Wharf.

Length, 15 mm.; diameter, 4 mm. (maximum diameter, 7 mm.).

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Greensboro.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

PLEUROTOMA (HEMIPLEUROTOMA) BELLACRENATA Conrad.

Plate XLI, Figs. 8, 9.

*Pleurotoma bellacrenata* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 30.

*Pleurotoma bellacrenata* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 185.

*Pleurotoma bellacrenata* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 181.

*Surcula bella-crenata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula bella-crenata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

*Pleurotoma bellacrenata* Harris, 1894, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Description*.—"Fusiform; whorls much contracted below the middle, with obsolete spiral lines, and crenate above the suture and on the shoulder of body whirl; body whirl with five or six strong spiral striæ, and an intermediate fine line; back finely striated. Length  $1\frac{1}{8}$  inch." Conrad, 1841.

The siphonal notch is on the shoulder of the whorl and is very distinct. The lines of growth bend sharply at the base of the sinus.

The beak is very short and somewhat twisted at the end, the twist extending upward on the columella.

Length (restored), 45 mm.; diameter, 13 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

PLEUROTOMA (HEMIPLEUROTOMA) CALVERTENSIS n. sp.

Plate XLI, Figs. 10, 11.

*Pleurotoma calvertensis* ? Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.  
(Name only.)

*Description*.—Shell subfusiform, slender, eight-whorled; upper third of each whorl flat, with two or three impressed spiral lines; lower part strongly convex, with rounded oblique costæ which are sometimes recurved at the upper end, and are usually crossed by about four faint, regular, impressed spiral lines and another stronger one above the suture; body whorl with about fifteen distinct impressed spirals below the costated shoulder; lines of growth strong, sweeping in broad curves around the notch which is on the shoulder; surface polished; suture impressed; beak short and slightly twisted.

There is a specimen in the National Museum which differs from the normal forms in having the longitudinal ribs almost obsolete, and in having a deep impressed revolving groove a short distance below the suture.

Length, 21 mm.; diameter, 6 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

Genus SURCULA H. and A. Adams.

SURCULA RUGATA Conrad.

Plate XLI, Figs. 12a, 12b.

*Surcula rugata* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 285.

*Surcula rugata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula rugata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

*Description*.—"Fusiform, turriculate; whorls 10, lower half obtusely ribbed, upper half concave, subangular, with much curved, rugose lines



of growth; beneath the suture whorls obtusely subcarinated, distinct revolving lines over the ribbed portion, minute and obsolete above it; suture profound; body whorl and beak striated; beak slightly curved." Conrad, 1862.

The sinus is in the middle of the subsutural concavity. It is very deep and distinct but gently rounded.

Length, 32 mm.; diameter, 12 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences.

#### SURCULA MARYLANDICA Conrad.

Plate XLI, Fig. 13.

*Pleurotoma Marylandica* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 30.

*Pleurotoma Marylandica* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 185.

*Pleurotoma Marylandica* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 182.

*Surcula Marylandica* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula marylandica* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

? *Pleurotoma marylandica* Meyer, 1888, Proc. Acad. Nat. Sci. Phila., vol. xl, p. 170.

*Pleurotoma marylandica* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Description*.—"Fusiform, with spiral wrinkled lines; upper half of whorls of spire concave, the lower convex, and with oblique ribs. Length  $2\frac{1}{2}$  inches." Conrad, 1841.

The spire and beak are attenuate, and the beak straight. The whorls are covered with distinct revolving spirals. The siphonal notch is above the shoulder, making the ribs oblique where they cross the shoulder. This species is distinguished by its oblique ribs, faint sculpture, and long, straight beak.

Length, 50 mm.; diameter, 16 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University.

## SURCULA BISCATENARIA Conrad.

Plate XLI, Fig. 14.

*Pleurotoma catenata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 223, pl. ix, fig. 13.

*Pleurotoma biscatenaria* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 140.

*Pleurotoma biscatenaria* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 186.

*Surcula biscatenaria* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula biscatenaria* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

Not *Pleurotoma catenata* Lamarck.

*Description*.—"Shell subfusiform; with two approximate chainlike or nodose carinæ on each whorl; the large whorl with strong revolving and intervening finer striæ; spire elevated, conical; whorls concave on the upper part; beak slightly recurved.

"The carinæ upon the whorls of the spire are placed nearest the base: the old shells of this species become quite thick, and have the right lip much arcuated; the spire occupies about half the length of the shell." Conrad, 1830.

This species has the deep, narrow, sharply incised notch of a true *Pleurotoma*, but the notch is distinctly above the shoulder near the center of the subsutural concavity.

There are specimens in the National Museum which probably belong to this species, although they may represent a variety. The only difference of these forms is that the notch is somewhat less sharply incised.

Length, 40 mm.; diameter, 15 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point (?).

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

## SURCULA ENGONATA Conrad.

Plate XLI, Fig. 15.

*Surcula engonata* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 285.

*Surcula engonata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

Not *Cochlespira engonata* Conrad, 1865.

*Description*.—"Fusiform; whorls 8, turrated, nodulose on the angle, very minute revolving lines above the angle, distinct below it; one line

more prominent near and below the suture; labrum margin rounded; body whorl with obsolete revolving lines." Conrad, 1862.

The subsutural band is deeply concave and the shoulder is very prominent and strongly nodular. The sinus is deep and gently rounded and is in the center of the subsutural band. The body whorl is as long as the spire, and the beak is attenuated and somewhat twisted.

Length, 16 mm.; diameter, 5 mm.

*Occurrence*.—ST MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

#### SURCULA ROTIFERA Conrad.

Plate XLI, Fig. 16.

*Pleurotoma rotifera* Conrad, 1880, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 224, pl. ix, fig. 9.

*Surcula rotifera* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula rotifera* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

*Description*.—"Shell subfusiform; spire with an elevated crenulated carina on each whorl; two approximate carinae near the middle of the large volution; sinus profound." Conrad, 1830.

The "*elevated crenulated carina*" occupies the middle of each whorl of the spire, and the shoulder of the body whorl. Below this, on the body whorl, are about ten elevated revolving lines, not carinated. The spire is coiled upon the second and most prominent of these. The sinus is deep and gently rounded and is situated half way between the shoulder and the suture.

Length, 25 mm.; diameter, 9 mm (8 whorls).

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

#### SURCULA MARIANA n. sp.

Plate XLI, Fig. 17.

*Description*.—Shell six-whorled; whorls strongly convex and deeply constricted at the suture, each with three or four smooth revolving

ridges; carinal ridge much stronger than the rest, next ridge closely above it and much smaller, and between that and the suture the surface is smooth save for faint, gently incurving lines of growth, which are obsolete elsewhere.

Length, 10 mm.; diameter, 4.5 mm.

This is referred to *Surcula* with considerable doubt, as the lip is broken and the growth lines almost obsolete.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collection*.—Maryland Geological Survey.

Genus MANGILIA Risso.

MANGILIA PARVA (Conrad).

Plate XLII, Figs. 1, 2.

*Pleurotoma parva* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 225, pl. ix, fig. 18.

*Surcula parva* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula parva* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

*Pleurotoma parva* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 24, 28.

*Surcula parva* ? Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 117, pl. xxi fig. 1.

*Description*.—"Shell subfusiform, transversely striated, with oblique longitudinal ribs; upper part of the whorls concave and plain." Conrad, 1830.

Shell, small, seven- to nine-whorled; spire attenuate; beaks short, slightly curved; entire surface marked with fine, regular revolving lines; each whorl with about ten longitudinal ribs which terminate on the shoulder in obtuse nodes; above the shoulder is a concave constriction which extends to the suture and contains the siphonal notch.

Length, 10 mm.; diameter, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, St. Mary's River, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.



## MANGILIA PARVOIDEA n. sp.

Plate XLII, Fig. 3.

*Description*.—Shell small, fusiform, seven-whorled; whorls very convex, with numerous faint oblique longitudinal ribs and almost obsolete closely set spiral striæ; apex of spire obtuse.

This species has somewhat the general appearance of *M. parva*, with which it is associated and has been confused. It is less slender than *parva* (very much so in the spire), less constricted at the suture, and has less prominent ribs. It also lacks the abrupt angularity of that species and is generally larger.

Length, 10 mm.; diameter, 4 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University.

## MANGILIA CORNELLIANA n. sp.

Plate XLII, Fig. 4.

*Description*.—Shell small, slender, fusiform, eight-whorled; whorls moderately convex; body whorl with about twelve obtuse longitudinal ribs; near the center of each whorl are two equally prominent raised revolving ribs with a very fine one between them, and on either side of them about four other spiral ribs intermediate in size between them and the medial one; lines of growth faint; sinus not deep; beak short, slightly curved, and strongly striated.

Length, 8 mm.; diameter, 2 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Cornell University.

## MANGILIA PATUXENTIA n. sp.

Plate XLII, Fig. 5.

*Description*.—Shell small, fusiform, five-whorled (without the two-whorled nucleus); later whorls strongly rugose, with 9 to 11 sharply elevated costæ crossed by two or three elevated revolving lines on each whorl of the spire and by many more on the body whorl; revolving lines

obsolete between the ribs; ribs terminated below the suture by a narrow smooth band, above which is a strong revolving line which margins the suture; mouth  $\frac{2}{3}$  the length of the shell, nearly uniform in width for the greater part of its length, but widening slightly near the upper end; beak slightly curved; nucleus two-whorled, globose, smooth for a whorl and a half, then with faint reticulate markings.

Length, 8 mm.; diameter, 2 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf.

*Collection*.—Maryland Geological Survey.

Subgenus GLYPHOSTOMA Gabb.

MANGILIA (GLYPHOSTOMA) OBTUSA n. sp.

Plate XLII, Fig. 6.

*Description*.—Shell short, six-whorled, spire  $\frac{1}{3}$  the length of the shell; later whorls with about eight obtuse nodes; entire shell covered with faint raised revolving striæ of which there are two very distinct ones on the line of nodes; lines of growth faint; mouth narrow; labium with a large serrated callosity at the posterior end and about nine small denticles along the columella; labrum thickened, and with about eight denticles along its inner face.

Length, 10 mm.; width, 4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

Genus DRILLIA Gray.

DRILLIA INCILIFERA (Conrad).

Plate XLII, Fig. 7.

*Pleurotoma gracilis* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 225, pl. ix, fig. 10.

*Pleurotoma incilifera* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 140. \*

*Pleurotoma gracilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Surcula gracilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Surcula gracilis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

Not *Pleurotoma gracilis* Brander.

*Description*.—"Shell subfusiform; spire and beak attenuated; whorls with two revolving rows of tubercles on each, divided by a striated

sulcus; whorls strongly striated at the base; suture undulated; large whorl with strong distant revolving and intervening finer striæ. A variety occurs with only one row of tubercles on each whorl, and an impressed line beneath." Conrad, 1830.

Outline as shown in the figure, spire attenuate, beak of normal length for a *Drillia*; ten to fourteen oblique longitudinal ribs on each whorl, an impressed revolving line on the crest of the whorl divides them into two rows of tubercles. There are other impressed revolving lines, especially on the body whorl.

The specimens from St. Mary's River have a more attenuate spire and are more angular than those from Cove Point. They also grade in their character toward *var. distans*.

Length 16 mm., diameter 5.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Cornell University.

#### DRILLIA INCILIFERA VAR. ANGULATA n. var.

Plate XLII, Fig. 8.

*Description*.—Spire pyramidal and sharply pointed; body whorl short, angular on the shoulder; beak short, curved; sculptured like that of *var. distans*.

Length, 16 mm.; diameter, 5-7 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

#### DRILLIA INCILIFERA VAR. DISTANS (Conrad).

Plate XLII, Fig. 9.

*Pleurotoma gracilis var.* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 225.

*Drillia distans* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 285.

*Drillia distans* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

*Drillia distans* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

*Description*.—"A variety" [of *D. incilifera*] "occurs with only one row of tubercles on each whorl, and an impressed line beneath." Conrad, 1830.

"Turriculate, whorls 6, scalariform, with distant obtuse ribs on the lower half; suture waved, with an impressed line above it; body whorl with an impressed revolving line above and four raised revolving lines inferiorly; upper sinus of labrum deep and rounded, lower obsolete." Conrad, 1862.

The outline is very variable as the figures show.

Length, 20 mm.; diameter, 8 mm. Length, 15 mm.; diameter, 4 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Cornell University.

DRILLIA WHITFIELDI n. sp.

Plate XLII, Fig. 10.

*Drillia elegans* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 115, pl. xxi, figs. 2-4.

Not *Pleurotoma elegans* Emmons.

*Description*.—"The features described by the author \* are, perhaps, a little more pronounced on the New Jersey specimens than they would appear to have been on the specimens which he figures, while the line of nodes occurring above the sinus constriction are neither figured nor mentioned. Still, a species constructed according to his figure and description would scarcely fail to possess them. On the New Jersey specimens they are very conspicuous, while in all other features the specimens correspond well.

"There is much variation among the different individuals before me, especially in the comparative increase in the diameter of the shell in proportion to its length, to the amount of nearly or quite one-fourth of the whole diameter; also in the proportional strength and size of the nodes above the sutural band and in the strength of the spiral lines.

"The aperture of the shell is narrow and elongated and equal to more than one-third of the entire length of the shell. The outer lip appears to have been thickened, although all the specimens are too imperfect for positive statement. The inner lip has a decided callus at its upper end, while the notch is distinct but not deep. The longitudinal plicæ

\* Whitfield refers to Emmons.



are nearly vertical and on the body whorl extend to near the lower end. The spiral lines are numerous and mark the entire volution below the sutural band, but are often stronger on the lower part than above." Whitfield, 1894.

The spire is attenuate and the beak short and very slightly curved; suture indistinct: below the suture is a line of tubercles, separated by a concave band from the lower, obliquely ribbed portion of the whorl; sinus below the line of tubercles; surface marked with obsolete, raised spiral lines which override the ribs and are much more distinct on the lower half of the whorl.

Emmons' species is entirely distinct from this, being more elongate and entirely lacking the subsutural line of tubercles.

Length, 14 (?) mm.; diameter, 5 mm.

*Occurrence*.—CALVERT FORMATION. Church Hill.

*Collection*.—Maryland Geological Survey.

DRILLIA CALVERTENSIS n. sp.

Plate XLII, Fig. 11.

*Description*.—Shell small, slender, nine-whorled; spire high, tapering sharply; body whorl short, with ten to thirteen oblique longitudinal ribs terminating in a concave, subsutural constriction; raised revolving lines fine and close in the constriction, larger and more distant with many finer intermediate ones on the ribbed portion of the whorl; suture distinct, younger whorls overlapping the older; sinus deep, lines of growth sharp.

Length, 13 mm.; diameter, 4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

Section CYMATOSYRINX Dall.

DRILLIA LIMATULA Conrad.

Plate XLII, Figs. 12, 13.

*Pleurotoma limatula* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 224, pl. ix, fig. 12.

*Drillia limatula* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Drillia limatula* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (188), p. 21.

*Description*.—"Shell subfusiform, glabrous, with short oblique longitudinal ribs; whorls concave above and plain; left lip reflected over the columella with a callus at its superior termination." Conrad, 1830.

The specimens from Jones Wharf have impressed revolving lines on the base of the body whorl. Those from Plum Point are intermediate between *limatula* and *lunata* of H. C. Lea. They might be considered as a variety of either species.

Length, 40 mm.; diameter, 11 mm. (Plum Point). Length, 22 mm.; diameter 7 mm. (St. Mary's River).

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf, Flag Pond. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

DRILLIA LIMATULA VAR. DISSIMILIS Conrad.

Plate XLII, Figs. 14, 15.

*Pleurotoma dissimilis* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 224, pl. ix, fig. 11.

*Drillia dissimilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

*Drillia dissimilis* Meek, Miocene Check List, Smith. Misc. Coll. (183), p. 21.

*Description*.—"Shell conical, smooth; spire with obsolete oblique nodules joining the suture at the base of each volution; suture impressed; left lip with a callus at its superior termination; columella truncated; a slight sinus at the base of the right lip." Conrad, 1830.

This differs from *limatula* only in that the nodular ribs are more nearly obsolete.

Length, 21 mm.; diameter, 7 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

## DRILLIA LIMATULA VAR. PYRAMIDALIS n. var.

Plate XLII, Fig. 16.

*Description*.—Spire pyramidal, variable in acuteness; shoulder of body whorl angular; beak short, slightly curved at extremity; columella straight.

This variety differs from *limatula* as *angulata* does from *incilifera*.

Length, 14 mm.; diameter, 5 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, St. Mary's River, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

## DRILLIA PSEUDEBURNEA (Whitfield).

Plate XLII, Fig. 17.

*Pleurotoma pseudoburnea* Heilprin, 1887, Proc. Acad. Nat. Sci. Phila., vol. xxxix, p. 404.

*Pleurotoma (Drillia) pseudoburnea* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 114, pl. xxi, figs. 8-12.

*Description*.—"Spire elevated, of about ten volutions; apex papillate; whorls convex, porcellaneous, strongly ribbed, somewhat impressed on the shoulder; ribs numerous, deflected, those of the several whorls alternating in position. No revolving lines.

"Aperture about one-third the length of shell; canal slightly deflected; columellar lip well defined.

"Length, slightly exceeding a half inch." Heilprin, 1887.

This species differs from *limatula* in being more slender, less angular about the body whorl; the longitudinal ribs are longer, less nodose, not terminating abruptly at the concave subsutural band but sometimes continuing from suture to suture. I have not seen the revolving lines which Whitfield mentions.

Length, 20 mm.; diameter, 6 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

Genus CANCELLARIA Lamarck.

Subgenus CANCELLARIA s. s.

CANCELLARIA ALTERNATA Conrad.

Plate XLIII, Figs. 1, 2, 3.

*Cancellaria alternata* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 155.

*Cancellaria alternata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Cancellaria alternata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Cancellaria alternata* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 67, pl. iv, fig. 7.

*Cancellaria alternata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 112, pl. xx, figs. 5-10.

*Merica alternata* Cossmann, 1899, Essais de Paléoconch. Comp., vol. iii, p. 15.

*Description*.—"Shell short subfusiform; whorls six, with nine or ten thick, longitudinal, oblique costæ, with prominent spiral and finer intermediate striæ; spire subconical; aperture less than half the length of the shell; labium with three plaits, decreasing in size inferiorly, as in *Mitra*; aperture semilunar. Length, half an inch." Conrad, 1834.

"Whorls 6, rounded, with nine or ten prominent ribs, and prominent revolving distant striæ, and an intermediate fine line; spire conical; aperture less than half the length of the shell, sub-ovate; columella 3-plaited, plaits decreasing in size towards the base; umbilicus small; summits of volutions flattened; 5 of the larger revolving lines on the penultimate whorl." Conrad, 1866.

"Very many specimens show six or seven prominent spiral striæ, while others have only the five mentioned in the description. Most of them show from four to six fine raised lines on the summit of the whorl, a feature not mentioned in either description, and all have several other lines below the prominent ones mentioned. The form of the aperture of course varies with the proportional length of the shell." Whitfield, 1894.

This species is very variable as the above descriptions show. Conrad's type, which was from the Choptank formation, and the New Jersey specimens have a distinct umbilicus. This feature is almost always absent in the other Maryland specimens. The Jones Wharf specimens differ from the others in being uniformly short, thick-set, strongly ribbed, and not constricted at the suture. The specimens from the St. Mary's formation approach *C. lunata* very closely (through intermediate



forms), but are separated by their greater strength of ribbing and lack of flat tops on the whorls. The intermediate line is not a constant character.

Length, 16 mm.; diameter, 10 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, St. Mary's River. CHOPTANK FORMATION. Jones Wharf, Greensboro, Sand Hill (?), "Choptank River" (Conrad). CALVERT FORMATION. Plum Point, Church Hill, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences.

#### CANCELLARIA ENGONATA Conrad.

##### Plate XLIII, Fig. 4.

*Cancellaria engonata* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 32.

*Cancellaria engonata* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 188.

*Cancellaria engonata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Cancellaria engonata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Cancellaria engonata* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 68, pl. iv, fig. 8.

*Cancellaria engonata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Description*.—"Short fusiform, with strong spiral prominent lines; and numerous longitudinal costæ, not so distinct as the transverse lines; spire scalariform, volutions 4; columella with three plaits, the middle one very oblique; submargin of labium with prominent transverse lines. Length,  $\frac{3}{8}$  inch." Conrad, 1841.

"Short-fusiform, longitudinally ribbed, with prominent revolving lines, about 12 in number, from the shoulder to the base; whorls 5; spire conical, scalariform; aperture lunate; columella three-plaited, the middle one very oblique." Conrad, 1866.

Conrad's specimens were immature and his figure and descriptions are not characteristic. The species may be re-defined as follows:

Shell subfusiform, six-whorled; whorls very convex, deeply constricted at the suture, and widest about one-third the distance from the top; top of the whorl flat, slightly domed, or concave; whorls of the spire with twelve strong, raised, revolving ribs with wider interspaces; body whorl with twelve ribs below the shoulder, and nearly as many smaller

ones above; longitudinal costæ variable in distribution and development, often entirely absent; mouth widest above; labrum strongly crenulated; columella with three plaits, of which the upper is the largest, the middle the most oblique, and the lower is obsolete in the whorls of the spire.

This species differs from *C. lunata* in being much more constricted at the suture, and in having less distinct longitudinal ribs.

Length, 23 mm.; diameter, 13 (?) mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

#### CANCELLARIA LUNATA Conrad.

##### Plate XLIII, Fig. 5.

*Cancellaria lunata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 222, pl. ix, fig. 4.

*Cancellaria lunata* Lyell, 1845, Quart. Jour. Geol. Soc. London, vol. i, p. 421.

*Cancellaria lunata* Lyell, 1846, Proc. Geol. Soc. London, vol. iv, p. 555.

*Cancellaria lunata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Cancellaria lunata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Cancellaria scalarina* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 68, pl. iv, fig. 17.

*Cancellaria (Solatia) lunata* Cossmann, 1899, Essais de Paléoconch. Comp., vol. iii, p. 12.

Not *Cancellaria scalarina* Lamarck.

*Description*.—"Shell turreted, with longitudinal oblique ribs; transversely sulcated; whorls of the spire narrowed at the base and flattened on the summit; apex acute; right lip regularly toothed within; columella with three plaits, the upper one large and distant, and the last plait uniting with the base of the columella; aperture lunate." Conrad, 1830.

Some individuals resemble *C. alternata*. This species differs from *alternata* essentially in being proportionally longer, having a sharper spire, thinner shell, longitudinal ribs not as strong, and the tops of the whorls somewhat flat. In these characters it is intermediate between *alternata* and *engonata* but is sharply separated from both.

Conrad could not have intended his figure and description for *C. scalarina* Lamarck, which is a *Trigonostoma* somewhat resembling *T. biplicifera*. Conrad's description of *scalarina* applies to our speci-

mens of *lunata* as well as does his original description of the latter species, while the figure is much better.

Length, 20 mm.; diameter, 11 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, St. Mary's River, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences.

CANCELLARIA PRUNICOLA n. sp.

Plate XLIII, Figs. 6a, 6b.

*Description*.—Shell turreted, nearly as broad as long, six-whorled; with broad, flat tops (concave on some specimens), and straight sides perpendicular to the tops; longitudinal ribs, small, distinct, and numerous, with many fine, sharp, intermediate lines of growth; broad, raised spiral striae five in number on the side of each whorl except the body whorl which has twelve; tops of whorls almost without spirals; ribs and spirals at the same distance and of about the same prominence, giving a reticulate appearance; columella with three strong plaits; umbilicus small.

Length (restored), 24 mm.; diameter, 16 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

CANCELLARIA RETICULATOIDES n. sp.

Plate XLIII, Fig. 7.

*Description*.—Shell small, oval, four-whorled without the nucleus; nucleus four-whorled, smooth, depressed-naticoid, with its axis somewhat inclined to the left; spire with about five narrow-raised revolving ribs on each whorl, and with regular longitudinal ribs which become fainter on the later whorls; body whorl with about fifteen revolving ribs and almost obsolete longitudinal ones; columella with three plaits, the largest above and nearly horizontal, the others nearly horizontal to the aperture, then bending sharply down the columella, below the largest plait are two small, oblique denticles on the columella; labrum with about six denticles; umbilicus small. The general form of this species is much like that of *C. reticulata*.

Length, 13 mm.; diameter, 8 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

Subgenus ADMETE Moller.

CANCELLARIA (ADMETE) MARYLANDICA n. sp.

Plate XLIII, Fig. 8.

*Description*.—Shell small, slender, subfusiform, fragile, five-whorled; whorls convex and somewhat angular in the middle; body whorl with fourteen weak longitudinal ribs perpendicular to the suture, and with numerous raised spiral striæ which have a tendency to alternate in size; mouth less than half the length of the shell; columella plaits small, especially at the mouth.

Length, 10 mm.; diameter, 5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science.

Subgenus TRIGONOSTOMA Blainville.

CANCELLARIA (TRIGONOSTOMA) PERSPECTIVA Conrad.

Plate XLIII, Fig. 9.

*Cancellaria perspectiva* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 136.

*Cancellaria perspectiva* Hodge, 1841, Amer. Jour. Sci., vol. xli, p. 343.

*Cancellaria perspectiva* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Cancellaria perspectiva* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Cancellaria perspectiva* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 67, pl. iii, fig. 6.

*Description*.—"Shell subglobose, with irregular oblique prominent distant ribs, and obtuse prominent spiral lines, alternated in size; spire very short, conical; whorls profoundly channeled above; aperture obovate, rather more than half the length of the shell; labrum striated within; columella with three compressed plaits; the superior one very prominent; umbilicus wide, striated within; exhibiting the volutions to the apex." Conrad, 1834.



The only specimen known from Maryland is young and badly broken. Length, 12 mm.; diameter, 8 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collection*.—Wagner Free Institute of Science.

CANCELLARIA (TRIGONOSTOMA) BIPLICIFERA Conrad.

Plate XLIII, Fig. 10.

*Cancellaria biplicifera* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 31.

*Cancellaria biplicifera* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 187.

? *Cancellaria antiqua* Wagner, 1848, plate iii, fig. 3 (plates privately distributed).

? *Cancellaria antiqua* Bronn, 1848, Hand. Gesch. Nat., Index Pal., pt. i, p. 208.

? *Cancellaria antiqua* Bronn, 1849, Hand. Gesch. Nat., Index Pal., pt. ii, p. 465.

*Cancellaria (Trigonostoma) biplicifera* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Cancellaria (Trigonostoma) biplicifera* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Cancellaria biplicifera* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 67, pl. iii, fig. 4.

? *Cancellaria antiqua* Dall, 1898, Trans. Wagner Free Inst. Sci., vol. v, pt. ii, p. 11, pl. iii, fig. 3.

*Description*.—"Turritid, with thick longitudinal ribs, and spiral rather distant impressed lines; on the body whirl an occasional ["intermediate," 1841] fine line; space below the suture widely and deeply channelled; shoulder coronated; umbilicus small; columella concave, and with two plaits. Length  $1\frac{1}{2}$  inch." Conrad, 1842.

"Subovate, with rather thick, prominent ribs, and revolving, broad striæ, and an intermediate fine line; ribs slightly convex; summits of the whorls widely and deeply channelled; shoulder coronated; umbilicus small; columella concave, biplicate." Conrad, 1866.

This is the largest of the Miocene species of *Cancellaria* and one of the rarest.

There is little doubt that the form figured by Wagner but never described is of this species. The rest of his Miocene fossils were from Jones Wharf, which is the locality where this species occurs most abundantly and best developed.

Length, 57 mm.; diameter, 37 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences.

Subgenus SVELTIA Jousseaume.

CANCELLARIA (SVELTIA) PATUXENTIA n. sp.

Plate XLIII, Figs. 11a, 11b.

*Description*.—Shell small, slender, fragile, five-whorled; whorls deeply constricted at the suture, and strongly and regularly convex; body whorl with about 30 regular equidistant, raised spiral striæ, and with eight or nine strong, longitudinal ribs which are more prominent on the upper part of the whorl, and thus mask the regular convexity of the whorls, giving them the appearance of being flat on top, widest near the top, and sloping gently to the suture below; whorls of the spire with fifteen to twenty spiral striæ; protoconch depressed naticoid in shape, two whorled; mouth ovate; columella with two strong plaits above, and a very weak one below; labium thick, reflected; labrum broken in type.

Length, 10.5 mm.; diameter, 5.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf.

*Collection*.—Maryland Geological Survey.

CANCELLARIA (SVELTIA) CALVERTENSIS n. sp.

Plate XLIII, Fig. 12.

*Description*.—Shell small, five-whorled; whorls of the spire regularly and strongly convex, with eight or nine strong, raised, longitudinal ribs, and about fourteen raised, revolving ribs; sutures deep and distinct; umbilicus small; columella with three plaits increasing in size above; labrum dentate.

This species resembles *C. patuxentia* but is more elongate.

Length, 8.5 mm.; diameter, 4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—U. S. National Museum.

CANCELLARIA (SVELTIA) sp.

*Description*.—Shell small, slender, fragile; columella plaits, two, both very oblique; no umbilicus; longitudinal ribs small, distant; each whorl with eight or ten raised spiral striæ, with much broader interspaces.

This form has a general outline like *C. patuxentia*, but differs from that species in the characters noted above, and also in being less deeply

constricted at the suture, and in having smaller and more distant longitudinal ribs.

The only specimen has been badly broken, so no attempt is made to name or illustrate the species.

Length, 7 mm.; diameter, 3 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

Subgenus CANCELLARIELLA n. sub-g.

Shell small, depressed, Nerita-like. Mouth strongly canaliculate, with a deep anterior siphonal notch. Columella concave, with four plaits, of which there are two close together at the base, the upper being the strongest, one still stronger at the middle of the columella and one at the top which does not extend far in. Between the two middle ones is a deep concavity which, within, becomes a deep furrow overhung by the plaits. Back from the mouth all but the two medial plaits become obsolete. Umbilicus broad and prominent. Spire much depressed.

Type *Cancellaria* (*Cancellariella*) *neritoidea* Martin.

No other species has come to my notice which would fall in this subgenus.

CANCELLARIA (CANCELLARIELLA) NERITOIDEA n. sp.

Plate XLIII, Figs. 13a, 13b.

*Description*.—Whorls three; body whorl very large in proportion to the size of the shell; spire depressed; ornamentation consists of about twenty broad, impressed, revolving lines with broader, gently arched interspaces; lines of growth prominent; surface wrinkled by irregular varix-like undulations which are most prominent toward the suture; suture deeply impressed; ornamentation of the spire entirely destroyed if any ever existed; umbilicus long, crescent shaped, strongly wrinkled by lines of growth; mouth broadly subovate, and wider below than above; notch for the anterior canal very deep.

Length, 8 mm.; width, 8 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf.

*Collection*.—Maryland Geological Survey.

## CANCELLARIA CORBULU Conrad.

*Cancellaria corbulu* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 308.

*Description*.—"Short, subovate; whorls subscalariform, ribs 8 or 9 on the body whorl, prominent, flattened laterally, and crossed by prominent, alternate striæ, the larger ones rather distant and elevated; columella with three plaits, rectilinear; base subumbilicated; aperture nearly half the length of the shell. Length half an inch." "Loc. Maryland." Conrad, 1843.

No other reference has ever been made to this species, and the description is insufficient to identify it.

## Superfamily RHACHIGLOSSA.

## Family OLIVIDÆ.

Genus OLIVA Bruguiere.

## OLIVA LITTERATA Lamarck.

## Plate XLIV, Figs. 1a, 1b.

*Oliva litterata* Lamarck, 1810, Ann. du. Mus., vol. xvi, p. 315.

*Oliva litterata* Lamarck, 1822, Anim. sans Vertébr., vol. vii, p. 425.

*Oliva litterata* Lamarck, 1822, Tabl. Encyclop. et Meth., vol. iii, p. 651, pl. 362, figs. 1a, 1b.

*Oliva* sp. Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 126.

*Oliva litterata* Conrad, 1841, Amer. Jour. Sci., vol. xli, p. 345, pl. ii, fig. 1.

*Oliva litterata* Conrad, 1843, Trans. Amer. Assoc. Geol. and Nat., p. 108, pl. v, fig. 1.

*Strephona literata* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 140, pl. xxviii, fig. 13.

*Oliva literata* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 259, fig. 30.

*Dactylus Carolinensis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, pp. 563, 584.

*Oliva carolinensis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Oliva litterata* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 44.

*Oliva Carolinensis* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 109, pl. xix, fig. 8.

*Oliva (Neocylindrus) carolinensis* Cossmann, 1899, Essais de Paléoconch. Comp., vol. iii, p. 46, pl. ii, figs. 20, 24.

*Description*.—"O. cylindræâ, elongatâ, cinereo fulvoque undatâ; fasciis duabus characteribus castaneo-fuscis inscriptis; spirâ acutâ." Lamarck, 1822.

Shell cylindroid, somewhat inflated above the middle of the body



whorl thick, polished; spire short, obtuse, about  $\frac{1}{8}$  or  $\frac{1}{7}$  of the length of the shell; suture deeply canaliculate; columella plaited throughout.

Conrad's description of *O. carolinensis* is as follows: "Cylindrical; spire short, conical; whorls concave or angulated; columella strongly plaited throughout; substance of shell very thick at base." Whitfield's specimen is too fragmentary to determine the species with certainty.

Length, 28 mm.; diameter, 11 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River (*vide* Say). CHOPTANK FORMATION. Greensboro, St. Leonard's Creek. CALVERT FORMATION. Church Hill.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences.

OLIVA HARRISI n. sp.

Plate XLIV, Figs. 2, 3.

*Oliva litterata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xl, p. 24.

Not *Oliva litterata* Lamarck.

*Description*.—Shell elliptical, narrow, elongate, fragile; spire high, pointed, about  $\frac{1}{4}$  or  $\frac{1}{5}$  the length of the shell; body whorl gently inflated above, sides uniformly rounded; lower end of the columella strongly callous.

This species differs from *O. litterata* in having a higher spire, in being proportionally narrower throughout, and in having the greatest inflation of the body whorl at a greater distance from the suture.

Length, 37 mm.; diameter, 14.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

#### Family MARGINELLIDÆ.

Genus MARGINELLA Lamarck.

MARGINELLA MINUTA Pfeiffer.

Plate XLIV, Fig. 4.

*Marginella minuta* Pfeiffer, 1840, Archiv für Naturgeschichte, vol. vii, p. 259.

*Marginella conulus* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia (Abst.),\* p. 12.

---

\* As all the forms in which this paper appeared are not generally known it may be well to call attention to the matter here.

A paper entitled "*Description of some new Fossil Shells from the Tertiary of Peters-*

*Marginella conulus* H. C. Lea, 1846, Trans. Amer. Philos. Soc., vol. ix, p. 273, pl. xxxvii, fig. 102.

*Porcellana conulus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 563.

*Marginella* (*Volutella*) *conulus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.

*Marginella minuta* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 57.

*Description*.—"Testa ovata, glabra, alba; spira brevissima; anfract. 3; columella subquadruplicata; apertura augustissima. Long. 1, diam.  $\frac{2}{3}$  lin." Pfeiffer, 1840.

"Shell subovate, conoidal, thick, smooth, polished; spire conical, obtuse; sutures nearly obsolete; whorls three, flat; last whorl rounded; base smooth; mouth long, very narrow; columella with three folds near the base; outer lip thickened, rounded smooth." Lea, 1846.

The Maryland specimens have been compared with Lea's type and show no difference. Dr. Dall is authority for the equivalence of Lea's species with Pfeiffer's. The latter was described from Cuba and is recent, but also occurs in the Pliocene of North Carolina and Florida.

Great care has to be taken in separating this species from the young of *Erato perexigua* which occurs associated with it at Plum Point.

Length, 3.5 mm.; width, 2 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Greensboro. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Cornell University, U. S. National Museum.

#### MARGINELLA DENTICULATA Conrad.

##### Plate XLIV, Fig. 5.

*Marginella denticulata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 225, pl. ix, fig. 21.

*burg, Virginia*," was read by Henry C. Lea before the American Philosophical Society on May 29, 1843. An abstract of this paper is contained in the Proceedings of the American Philosophical Society, vol. iii, p. 162, published in 1843, which contains merely a list of species with descriptions of the new genera. In the library of the Philadelphia Academy of Natural Sciences is a pamphlet entitled "*Abstract of a Paper read before the American Philosophical Society, May 29, 1843, entitled 'Description of some new Fossil Shells, from the Tertiary of Petersburg, Virginia,' by Henry C. Lea, Philadelphia*," which contains twelve pages octavo (numbered "1-12") of Latin diagnoses of the new genera and species without figures, remarks or foot-notes. On the first page is written "*Issued Oct. 19th, 1843.*" In 1845 there appeared a quarto excerpt which was identical with the final publication in vol. ix, of the Transactions of the American Philosophical Society, except that it had a pagination of its own. Vol. ix in which the article made its final appearance was published in 1846.

- Marginella denticulata* Conrad, 1845, Fossils of the Medial Tertiary, pt. iv, p. 86, pl. xlix, fig. 10.  
*Porcellana (Glabella) denticulata* Conrad, 1868, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 564.  
*Marginella denticulata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (188), p. 19.  
*Marginella denticulata* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 51, pl. v, fig. 8.  
*Marginella (Eratoidea) denticulata* Cossmann, 1899, Essais de Paléoconch. Comp., vol. iii, p. 88.

*Description*.—"Shell smooth, polished, spire conical; columella four plaited, the three lower plaits oblique; right lip denticulate within; aperture rather more than half the length of the shell." Conrad, 1830.

"Subovate, polished; spire conical; columella 4-plaited; labrum denticulate within, straight, rather more than half the length of the shell." Conrad, 1845.

Dr. Dall, in the paper referred to above, has discussed the synonymy and characteristics of this species in great detail.

Length, 6.5 mm.; diameter, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences.

#### MARGINELLA CALVERTENSIS n. sp.

Plate XLIV, Fig. 6.

*Description*.—Shell elongate, solid, surface highly polished, and with faint longitudinal ribs; whorls about five; spire about the length of the body whorl; whorls strongly convex, with a marked subsutural constriction which gives the spire a turreted appearance; inner lip with a slight callus; outer lip thick and flaring; plates four, lower three very oblique, the posterior the strongest and least oblique.

Length, 10 mm.; diameter, 4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## Family VOLUTIDÆ.

Genus SCAPHELLA Swainson.

## SCAPHELLA SOLITARIA (Conrad).

Plate XLIV, Fig. 7.

*Voluta solitaria* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 218, pl. ix, fig. 7.

*Voluta solitaria* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 563.

*Voluta solitaria* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.

*Scaphella solitaria* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 80.

*Scaphella solitaria* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Description*.—"Shell ovate oblong, smooth; spire with the whorls concave above, and straight at the sides, having the angles tuberculated; aperture dilated at the base; columella four plaited.

"The large whorl is obsoletely striated at the base, and the plaits on the columella are oblique and subequal." Conrad, 1830.

There are a few important characteristics not noted in the original description. Dr. Dall states that the color pattern is the same as on the recent *S. junonia* Hwass, which is the type of the genus. The nucleus is very obtuse with no elevated point and its second whorl is marked by four deeply impressed, regularly spaced, revolving grooves which die out as the shoulder becomes tuberculate.

The specimens from Plum Point have a much more angular and more strongly tuberculate shoulder, with a deeper concavity above it, than those from the younger beds, and the body whorl is more strongly striate at the base. One specimen from Plum Point has faint revolving striæ above the shoulder of the body whorl. The specimens from St. Mary's River frequently have the shoulder entirely free from tubercles and not at all angular; this is especially true of the later whorls.

Length, 43 mm.; diameter, 23 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum.



Subgenus AURINIA Adams.

SCAPHELLA (AURINIA) MUTABILIS (Conrad).

Plate XLIV, Figs. 8, 9.

*Voluta Lamberti* Morton, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 119.  
*Fasciolaria Lamberti* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser.,  
 p. 210.

(Not *Voluta lamberti* Sowerby.)

*Fasciolaria mutabilis* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser.,  
 p. 135.

*Fasciolaria mutabilis* Conrad, 1841, Amer. Jour. Sci., vol. xli, pp. 343, 346, pl. ii,  
 fig. 7.

*Fasciolaria mutabilis* Conrad, 1843, Trans. Amer. Assoc. Geol. and Nat., p. 109,  
 pl. v, fig. 7.

*Voluta mutabilis* Lyell, 1845, Quart. Jour. Geol. Soc. London, vol. i, p. 421.

*Voluta mutabilis* Lyell, 1846, Proc. Geol. Soc. London, vol. iv, p. 555.

*Voluta mutabilis* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina,  
 p. 128, pl. xxvii, figs. 5, 6.

*Voluta mutabilis* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 262.

*Voluta (Volutifusus) mutabilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv,  
 p. 563.

*Voluta (Volutifusus) mutabilis* Meek, 1864, Miocene Check List, Smith. Misc. Coll.  
 (188), p. 19.

*Scaphella (Aurinia) mutabilis* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii,  
 pt. i, p. 80.

*Scaphella (Aurinia) mutabilis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii,  
 pt. ii, p. 227.

*Scaphella (Aurinia) mutabilis* Cossmann, 1899, Essais de Paléconch. Comp., vol.  
 iii, p. 129.

*Description*.—"Shell fusiform; spire conical with the whorls slightly contracted above, and the convex portion with longitudinal undulations, becoming obsolete in old shells; apex somewhat papillated; labrum arcuated; columella with two very oblique not much elevated folds, sometimes obsolete; beak slightly recurved; aperture more than two thirds the length of the shell. Length about four inches." Conrad, 1834.

Surface marked by very faint, wavy, revolving striæ; beak usually straight with the plaits almost or quite invisible at the mouth but rapidly becoming stronger within; but the beak is sometimes much bent and then the plaits show strongly at the mouth.

Length (restored), 180 mm.; diameter, 60 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences.

## SCAPHELLA (AURINIA) TYPUS (Conrad).

Plate XLIV, Fig. 10.

*Voluta mutabilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 182.*Volutifusus typus* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 67, pl. iii, fig. 2.*Volutifusus typus* Tryon, 1882, Manual of Conchology, vol. iv, p. 77, pl. iii, fig. 31.*Scaphella (Aurinia) virginiana* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 80.*Scaphella (Aurinia) virginiana* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 227.*Scaphella typus* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.*Scaphella (Aurinia) virginiana* Cossmann, Essais de Paléconch. Comp., vol. iii, p. 128, pl. vi, fig. 3.

*Description*.—"Fusiform, thick in substance; whorls 6, besides the initial one, slightly concave above, with an angle near the suture, obscurely plicated; labrum thick near the summit, with an acute margin; columella with two distinct, little prominent folds; beak sinuous." Conrad, 1866.

This species shows great variation in proportional dimensions, curve of the beak, and size of the columella plaits. The plaits are much stronger on the specimens from Jones Wharf than on those from Plum Point. They stop abruptly on reaching the mouth. The surface is covered with faint revolving striæ.

Dr. Dall says that the name *typus* is "inapplicable," "misleading," "contrary to fact," and "cannot be retained." I do not recognize that a well-established and accepted specific name can be changed for the reasons quoted above; but if it can, the name *virginiana* is equally "misleading," "inapplicable," etc., when applied to a fossil which has been reported only from Maryland and North Carolina, and must also be rejected. In that case I propose the name *Conradiana*.

Length, 85 mm.; diameter, 40 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run. CALVERT FORMATION. Plum Point, Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

## SCAPHELLA (AURINIA) OBTUSA (Emmons).

Plate XLIV, Fig. 11.

*Voluta obtusa* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 263, fig. 141.*Voluta obtusa* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 563.

*Voluta obtusa* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.

*Scaphella (Aurinia) obtusa* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 80, pl. vii, fig. 7.

*Scaphella (Aurinia) obtusa* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 227.

*Scaphella (Aurinia) obtusa* Cossmann, 1899, Essais de Paléoconch. Comp., vol. iii, p. 129.

*Description*.—"Shell fusiform, contracted above the body-whirl, and forming thereby a sub-cylindrical spire; spire obtuse apex papillated and hooked; body-whirl plaited longitudinally at its top; columellar lip furnished with only two plaits." Emmons, 1858.

The body whorl is covered with fine, closely-set, revolving striae, and the shoulder is tuberculate. Aside from the size of the nucleus there is no great difference between our Maryland specimens and the young of *S. typus*.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CALVERT FORMATION. Plum Point.

*Collections*.—Philadelphia Academy of Natural Sciences, U. S. National Museum.

#### TURBINELLA (?) DEMISSA Conrad.

*Turbinella demissa* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 136.

Not *Caricella demissa* Conrad.

*Description*.—"Shell fusiform, with very obscure spiral striae; whorls slightly contracted above, the convex part having obscure longitudinal undulations; suture impressed; spire elevated; columella with three profound thickened plaits; the superior one shortest and most thickened; beak produced, recurved. Length, two and a half inches.

"Locality, Choptank river, Md." Conrad, 1834.

This species has never since been found, nor referred to in the literature, nor has any gastropod of this size or at all of this general description been found on the Choptank. But this same bed contains at Jones Wharf and Governor Run *Scaphella typus* which answers exactly to the above description except that it has two folds on the columella instead of three.

In the collections of the Philadelphia Academy of Natural Sciences is a specimen labelled "*Voluta sinuosa miocene*," which may be the type of this lost species. Only part of the body whorl is present and the

external markings are not well shown, but the plaits and the beak are exactly as in the description of *demissa*. The matrix is a coarse, yellow, indurated sand.

SCAPHELLA TRENHOLMII (Tuomey and Holmes).

*Voluta Trenholmii* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 128, pl. xxvii, figs. 7, 8.

*Scaphella Trenholmii* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 88.

Dr. Dall records this species from Maryland without locality.

Family MITRIDÆ.

Genus MITRA Lamarck.

MITRA MARIANA n. sp.

Plate XLIV, Fig. 12.

*Description*.—Shell small, solid, six-whorled; mouth half the length of the shell; labium with a callosity at the upper end; columella three-plaited, strongest plait above; sutures distinct; whorls slightly convex; surface with regular impressed revolving lines and longitudinal ribs, both of which are nearly obsolete on the body whorl; lines of growth faint.

Length, 8 mm.; diameter, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Wagner Free Institute of Science, Cornell University.

Family FASCIOLARIDÆ.

Genus FULGUR Montfort.

FULGUR SPINIGER (Conrad) var.

Plate XLV, Figs. 1a, 1b.

*Fusus spiniger* Conrad, 1848, Jour. Acad. Nat. Sci. Phila., vol. i, 2nd ser., p. 117, pl. xi, fig. 32.

? *Busycon striatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 584.

? *Busycon striatum* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 69, pl. iii, fig. 8.

*Fulgur spiniger* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 109.

*Description*.—"Fusiform, with revolving lines, and a series of elevated acute spines on the angle of the large whorl; the series continued



on the whorls of the spire near the suture; two upper whorls entire; sides above the tubercles flattened, with the revolving lines fine and indistinct; volutions seven; beak produced; labrum striated within." Conrad, 1848.

This species, which originated and flourished abundantly during the Oligocene, has evidently survived on through the lower and middle Miocene. At the close of the middle (Choptank) Miocene it apparently disappeared, leaving three descendants in the upper (St. Mary's) Miocene. These are *F. fusiforme*, *F. tuberculatum* and *F. fusiforme* var. It is possible the *F. scalaspira* Conrad represents this form. If not it represents another variety of *F. spiniger* or a transitional form between that species and *F. coronatum*.

Length, 80 mm.; diameter, 40 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

#### FULGUR FUSIFORME Conrad.

Plate XLV, Figs. 2, 3a, 3b.

*Fulgur carica* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 130. (Reprint, Bull. Amer. Pal., No. 5, 1896, p. 36.)

*Pyrula carica* Morton, 1829, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 118.

*Pyrula carica* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Fulgur fusiformis* Conrad, 1840?, Fossils of the Medial Tertiary, No. 2 (cover). (Reprint, 1893, cover of No. 2, p. [80].)

*Fulgur fusiformis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 183, 187.

*Fulgur fusiformis* Conrad, 1853, Proc. Acad. Nat. Sci. Phila., vol. vi, p. 318.

*Busycon fusiforme* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 82, pl. xlv, fig. 3. (Reprint, 1893.)

*Busycon fusiforme* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Busycon fusiforme* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Fulgur fusiformis* Gill, 1867, Amer. Jour. Conch., vol. iii, p. 146.

*Busycon fusiforme* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 267, pl. xxiii, fig. 4.

*Description*.—"Shell fusiform, with spiral striæ, obsolete, except on the inferior half of the body whorl, where they are prominent, wrinkled, and alternated in size; spire elevated, whorls with obtuse little prominent tubercles at the angle, which is situated near the suture, and is obtuse." "Allied to *F. carica*." Conrad, 1840, 1853, 1861.

This species shows great variation in all its characters. The typical

*fusiforme* is intermediate both in its genetic relationship and in its morphologic character between *spiniger* and *caricum*. It differs from the former in usually possessing a more depressed spire and in having the spiral striæ on the upper part of the body whorl more nearly obsolete. It is practically indistinguishable from the young of the latter, as would be expected of the ancestral form; but differs from the adult in not attaining as great size and in lacking in general those characters which distinguish the adult from the young of that species. Considering the extremely variable Calvert and Choptank descendants of *F. spiniger* as merely surviving varieties of that Oligocene species, the first appearance of *F. fusiforme* is in the St. Mary's Miocene. Here it shows considerable variation ranging on one hand to the short rugose form with a carinated shoulder which Conrad named *F. tuberculatum*, and on the other to a more elongate form with a smooth, rounded, somewhat polished shoulder which is here treated as an unnamed variety and figured (plate XLV, fig. 3).

The former died out without descendants at the end of the St. Mary's Miocene; and the latter did likewise, unless *F. maximum* of the Yorktown and Duplin Miocene and *F. rapum* of the Pliocene be considered descendants.

The typical form of the species, as stated above, is a link between *F. spiniger* and *F. carica*, and left in the Yorktown Miocene *F. filosum* as a descendant, either from which, or contemporaneously with which, appeared the Pliocene to Recent *F. carica*.

Length, 70 mm.; diameter, 36 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University.

#### FULGUR TUBERCULATUM Conrad.

Plate XLV, Figs. 4a, 4b.

*Fulgur tuberculatus* Conrad, 1840?, Fossils of the Medial Tertiary, No. 2, cover. (Reprint, 1893, cover of No. 2, p. [80].)

*Fulgur tuberculatus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 185.

*Fulgur tuberculatum* Conrad, 1853, Proc. Acad. Nat. Sci. Phila., vol. vi, p. 317.

*Busyon tuberculatum* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 82, pl. xlvi, fig. 2. (Reprint, 1893.)

*Busycon tuberculatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Busycon tuberculatum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Fulgur tuberculatus* Gill, 1867, Amer. Jour. Conch., vol. iii, p. 146.

*Busycon tuberculatus* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 266, pl. xxiii, fig. 1.

*Description*.—"Shell fusiform with spiral striæ, obsolete on the upper part of the body whorl; spire elevated, whorls with a carinated line at the angle and compressed prominent tubercles; suture impressed and margined by an obtuse slightly prominent line." Conrad, 1840.

"Fusiform, with revolving striæ; spire elevated; angle of the whorl carinated and crowded with prominent tubercles; body whorl ventricose.

"Allied to *F. fusiformis*, but is more ventricose, proportionally shorter. It may readily be distinguished by the carina of the volutions, which is very strongly marked towards the apex." Conrad, 1853.

This variety, as stated above, is a descendant of the Calvert and Choptank varieties of *F. spiniger* and survived only during the St. Mary's Miocene. It was never numerically abundant, nor were its characteristics constant.

Length, 75 mm.; diameter, 42 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences, Cornell University.

#### FULGUR CORONATUM Conrad.

##### Plate XLVI, Figs. 1a, 1b.

*Pyrula canaliculata* var. Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 220.

*Fulgur coronatus* Conrad, 1840 ?, Fossils of the Medial Tertiary No. 2, cover. (Reprint, 1893, cover of No. 2, p. [80].)

*Fulgur coronatum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 183, 187.

*Fulgur coronatum* Conrad, 1853, Proc. Acad. Nat. Sci. Phila., vol. vi, p. 317.

*Busycon coronatum* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 82, pl. xlvi, fig. 1. (Reprint, 1893, p. 82, pl. 46, fig. 1.)

*Busycon coronatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Busycon coronatum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Sycotypus coronatus* Gill, 1867, Amer. Jour. Conch., vol. iii, p. 149.

*Sycotypus coronatus* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 267, pl. xxiv, fig. 1.

*Fulgur coronatum* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 24, 28.

*Description*.—"Shell fusiform, ventricose, with crowded fine spiral wrinkles; spire short; whorls flattened above, and having elevated compressed tubercles or spines on the angle, which is somewhat salient; suture canaliculate and margined by an obtuse carinated line." Conrad, 1840?

"Very distinct from the recent *canaliculatum*, being less ventricose and having prominent tubercles in all stages of growth." Conrad, 1853.

The species as here restricted is characterized by having distant, elevated tubercles and fine, revolving lines. It is sometimes difficult to separate the following variety and it is not essential that it should be done.

Length, 130 mm.; diameter, 75 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point (?).

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

#### FULGUR CORONATUM VAR. RUGOSUM Conrad.

##### Plate XLVI, Figs. 2a, 2b.

*Fulgur canaliculatus* var. Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 129. (Reprint, Bull. Amer. Pal., No. 5, 1896.)

*Pyrula canaliculata* Morton, 1829, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 118.

*Fulgur canaliculatus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Fulgur rugosus* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 307.

*Fulgur rugosus* Conrad, 1853, Proc. Acad. Nat. Sci. Phila., vol. vi, p. 317. (In part.)

*Fulgur canaliculatum* Lyell, 1855, Manual of Geology, p. 182, fig. 164.

*Busycon rugosum* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 82, pl. xlv, fig. 4. (Reprint, 1893.)

*Busycon rugosum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Busycon rugosum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Sycotypus rugosus* Gill, 1867, Amer. Jour. Conch., vol. iii, p. 149.

*Sycotypus rugosus* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 267, pl. xxiv, fig. 24.

*Description*.—"Pyriform, with rather coarse rugose revolving lines, disposed to alternate in size, and very distinct numerous lines of growth; whorls scalariform, with a tuberculated carina, the margin of which presents a waved outline, the tubercles being obtuse; spire



prominent, profoundly channelled at the suture, the margin of the channel carinated in young shells. Length, 3 inches. Conrad, 1861.

"Compared with *F. coronatus*, this species, when adult, is comparatively shorter and more inflated, with a shorter spire, much coarser revolving lines, which with the more numerous, more obtuse tubercles, give the shell a very different appearance from the *coronatus*. In an adult specimen of the latter species there are 13 spiniform tubercles on the body whorl. In the allied species, when adult, there are 17 much less elevated, more irregular, and more obtuse tubercles." Conrad, 1843.

This variety stands intermediate, as regards the development of tubercles between the typical *coronatum* and *canaliculatum*. The first four whorls of the latter species are indistinguishable from those of *rugosum*. This caused the confusion of the species so evident in the early literature. In the later stages of development there was a tendency for the tubercles to disappear, and some of the Miocene forms show in the adult an approximation to this character of their descendants. The species is perfectly distinct from the adult of *canaliculatum*.

Length, 170 mm.; diameter, 90 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point. CHOPTANK FORMATION. Jones Wharf, Greensboro. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences.

#### FULGUR ALVEATUM (Conrad).

*Busycon alveatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 583.

*Busycon alveatum* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 68, pl. iii, fig. 7.

*Fulgur pyrum* var. *incile*, Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 112.

*Description*.—"Fusiform; spire prominent, scalariform; angle of whorls situated much above the middle, not tuberculated; summits channelled and margined with a carina, which is most conspicuous on the body whorl, and beneath it is a flattened space. Length  $3\frac{1}{4}$  inches, width  $1\frac{1}{2}$ .

"Locality, St. Mary's River, Md.

"A single specimen only was found, which appears to be a mature shell, and is most nearly allied to *B. canaliculatum*. The spire is more elevated than in that species, and differs also in being without tubercles." Conrad, 1862.

This species has been found at the St. Mary's River by no one else and so the occurrence is considered doubtful.

Genus LIROSOMA Conrad.

LIROSOMA SULCOSA Conrad.

Plate XLVII, Fig. 1.

*Pyrula sulcosa* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 220, pl. ix, fig. 8.

*Fusus sulcosus* Conrad, 1832, Fossil Shells of the Tertiary No. 1, p. 18, pl. iii, fig. 3. (Reprint, 1893, p. 18 (p. 32).)

*Fusus sulcosus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Fasciolaria sulcosa* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 86, pl. xlix, fig. 7.

*Fasciolaria (Lirosoma) sulcosa* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 286.

*Fasciolaria (Lyrosoma) sulcosa* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 561.

*Fasciolaria (Lyrosoma) sulcosa* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (188), p. 21.

*Lirosoma sulcosa* Conrad, 1867, Amer. Jour. Conch., vol. iii, p. 267, pl. xxiii, fig. 3.

*Lirosoma sulcosa* Tryon, 1881, Manual of Conchology, vol. iii, p. 50, pl. xix, fig. 53. Not *Fasciolaria (Lyrosoma) sulcosa* Whitfield, 1894.

*Lirosoma sulcosa* Cossmann, 1901, Essais de Paléconch. Comp., vol. iii, p. 79, pl. iv, fig. 4.

*Description*.—"Shell pyriform; ventricose; transversely ribbed, and longitudinally sulcated; summit of the whorls flattened, and subcanaliculate; right lip striated within; channel much contracted; beak straight or slightly recurved at the base." Conrad, 1830.

"Pyriform, body whorl rounded; spire short; summit of the volutions flattened, subcanaliculate; ribs prominent, revolving, crossed by longitudinal curved lines; labrum striated within; beak straight or slightly recurved at the base; channel much contracted; columella with a fold at base." Conrad, 1861.

Length, 25 mm.; diameter, 15 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University.

## Family BUCCINIDÆ.

Genus CHRYSODOMUS Swainson.

## CHRYSODOMUS PATUXENTENSIS n. sp.

Plate XLVII, Figs. 2, 3.

*Description*.—Shell small, fusiform, five-whorled; spire short, body whorl  $\frac{2}{3}$  the length of the shell; whorls carinated at about the middle by a broad revolving ridge, flat and straight below the ridge, slightly sloping above it—thus giving the whorls a strongly turreted appearance; whorls of the spire with one raised revolving line immediately below the suture, one or two fainter ones between that and the shoulder, and two stronger ones above the suture; body whorl with the same revolving lines and 12–18 additional revolving lines below them and on the beak; entire surface covered with numerous fine, sharp, regular lines of growth which bend at the shoulder; beak long, slightly bent; columella concave; aperture narrowing below.

There is great variation in the relative prominence of the different revolving ribs, and in the angularity at the shoulder. This is especially true of the Plum Point specimens.

Length, 16 mm.; diameter, 8 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Cornell University.

Genus BUCCINOFUSUS Conrad. •

This genus was established by Conrad in 1868 with *Fusus parilis* as the type. Among the species which Conrad referred to it at that time is *F. berniciensis* King which is the type of *Troschelia* Mörch, 1876, and *Boreofusus* Sars, 1878. It is difficult to understand on what ground Fischer considers *Buccinofusus* a synonym of *Troschelia*.

## BUCCINOFUSUS PARILIS Conrad.

Plate XLVII, Fig. 4.

*Fusus cinereus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., pp. 211, 223.

*Fusus parilis* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 18, pl. iv, fig. 2. (Reprint, 1893.)

*Fusus parilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 183, 185 (?), 187.

*Fusus parilis* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 85, pl. xlix, fig. 5.

*Neptunea parilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Neptunea parilis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Buccinofusus parilis* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 264.

*Buccinofusus parilis* Tryon, 1881, Manual of Conchology, vol. iii, p. 47, pl. xxviii, fig. 40.

*Buccinofusus parilis* Cossmann, 1901, Essais de Paléoconch. Comp., vol. iv, p. 33, pl. i, fig. 10.

*Description*.—"Fusiform, elongated, with longitudinal ribs or undulations, and rather distant revolving subacute ribs, between which are 6 or 7 fine, minutely crenulated or wrinkled striæ; beak produced and slightly reflected." Conrad, 1832.

Length, 112 mm.; diameter, 57 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Wagner Free Institute of Science, Cornell University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

Genus SIPHONALIA Adams.

SIPHONALIA DEVEXA (Conrad).

Plate XLVII, Figs. 5, 6.

? *Fusus parilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 185.

*Fusus devexus* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 309.

*Fusus devexus* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 86, pl. xlix, fig. 8.

*Neptunea devexa* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Neptunea devexa* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Fusus devexus* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Description*.—"Fusiform, with obtuse longitudinal ribs, obsolete near the upper margin where the whorls are somewhat contracted; ribs on the body whorl disappear just below the angle; above which the whorl is flattened, wide and profoundly declining; surface with robust, prominent and fine intermediate spiral lines: aperture more than half the length of the shell: beak sinuous. Length, two inches." Conrad, 1843.

Length, 85 mm.; diameter, 38 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Pawpaw Point. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.



## SIPHONALIA MIGRANS (Conrad).

Plate XLVII, Figs. 7, 8.

*Fusus migrans* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 309.*Fusus migrans* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 85, pl. xlix, fig. 6.*Tritonifusus migrans* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.*Fusus migrans* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Description.*—"Fusiform, elongated; surface with crowded unequal impressed spiral lines, and strong arched lines of growth; whorls contracted above, rounded towards the suture; whorls near the apex longitudinally ribbed; aperture half the length of the shell; beak much recurved. Length, three inches and a half." Conrad, 1843.

This species differs from *S. devesa* in lacking the longitudinal ribs on the later whorls, and in lacking the angulated shoulder of that species.

Length, 70 mm.; diameter, 30 mm.

*Occurrence.*—CALVERT FORMATION. Plum Point.

*Collections.*—Maryland Geological Survey, U. S. National Museum, Philadelphia Academy of Natural Sciences.

## SIPHONALIA MARYLANDICA n. sp.

Plate XLVIII, Figs. 1a, 1b.

*Description.*—Fusiform, elongate; whorls seven, strongly and regularly convex; longitudinal undulations (as in *Buccinofusus parilis*) on the earlier whorls, but becoming obsolete, and entirely absent on the body whorl; body whorl and spire with about twenty broad rounded revolving ribs; earlier whorls with about six, alternating with these striae are smaller ones, with sometimes a pair of still finer ones on either side of them; columella concave above, sharply bent at the beginning of the canal, with almost a plate; canal contracted, of the same width throughout; labrum only slightly sulcate, not flaring below; labium with a thick callosity.

This differs from *Buccinofusus parilis* in that its whorls are more strongly convex, its suture more distinct, the revolving ribs rounded instead of sharp, not having the fine sharp intermediate lines or the longi-

tudinal ribs on the body whorl; the columella is callous and more sharply bent, the canal narrower, especially at the base, where it is bent down and slightly back; the canal and mouth more sharply separated, the body whorl is contracted at the base where it joins the beak.

Length, 100 mm.; diameter, 47 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Cornell University, Wagner Free Institute of Science.

SIPHONALIA(?) CALVERTANA n. sp.

Plate XLVIII, Fig. 2.

*Description*.—Shell subfusiform, slender; whorls three+, lower part of each straight, upper part sloping at an angle of about  $45^{\circ}$  with the lower part, angle of the whorl not marked by any distinct shoulder; mouth long, widest above and narrowing rapidly below into a long slightly bent canal; columella smooth, slightly twisted; body whorl with about 40 longitudinal ribs which become obsolete below, and about 10 broad revolving ribs with narrower interspaces, together giving the whorl a strongly reticulate appearance; beak with about 10 finer revolving ribs and with no longitudinal ones; spire with less distinct sculpture, the longitudinal ribs passing into crowded rugose lines of growth; first whorl of the nucleus smooth and depressed, second whorl elevated, angular, and differing from the succeeding whorls of the spire only in having very feeble sculpture.

Length, 10 mm.; diameter, 4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Cornell University, U. S. National Museum.

Genus PISANIA Bivona.

Subgenus CELATOCONUS Conrad.

The name *Celatoconus* was used by Conrad and by Meek as noted below but was not defined by them. The first diagnosis is that given by Dall, in 1892, when he established the subgenus with *C. protractus* Conrad as the type.

## PISANIA (CELATOCONUS) PROTRACTUS (Conrad).

Plate XLVIII, Figs. 3a, 3b, 4.

*Buccinum protractum* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 308.*Celatoconus protractus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566.*Celatoconus protractus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.*Celatoconus protractus* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 267, pl. xx, fig. 6.*Pisania (Celatoconus) protractus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iiv, pt. ii, p. 235.*Metula (Celatoconus) protracta* Cossmann, 1901, Essais de Paléconch. Comp., vol. ii, p. 166.

*Description*.—"Subfusiform, elevated; with robust flattened spiral ribs about as wide as the interstices, both ribs and furrows crossed by distinct prominent longitudinal lines; aperture long and elliptical; labrum with short, submarginal prominent lines; beak slightly recurved. Length, one inch and a third." Conrad, 1843.

Conrad's description is fully adequate for the recognition of the species as there is nothing in the American Tertiary even generically resembling it except *Celatoconus nux* Dall from the Miocene of North Carolina.

There is a slight tendency for the revolving ridges to become alternating in size on the later whorls; the labrum is always denticulate, and the shell is generally less elongated than Conrad's figure indicates.

Length, 35 mm.; diameter, 15 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences, U. S. National Museum.

Genus PTYCHOSALPINX Gill.

PTYCHOSALPINX ALTILIS (Conrad).

Plate XLVIII, Fig. 5.

*Buccinum altile* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 19, pl. iv, fig. 6.*Ptychosalpinx altilis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 237.*Cominella (Ptychosalpinx) altilis* Cossmann, 1901, Essais de Paléconch. Comp., vol. iv, p. 150, pl. vi, fig. 19.

*Description*.—"Subovate, with numerous longitudinal undulations and obtuse spiral striae; body whorl rather ventricose; spire conical; apex obtuse." Conrad, 1832.

As is stated below (p. 191) the forms here and by Dall referred to *P. altilis* possibly are normal forms of the species figured by Say as *Buccinum porcinum* and *Buccinum aratum*. This possibility is suggested by the fact that Say's species have never since then been found at the St. Mary's River, while the forms here figured, which are by no means rare, were not distinguished by the early workers.

Length, 30 mm.; diameter, 18 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences, Cornell University, U. S. National Museum.

#### PTYCHOSALPINX MULTIRUGATA Conrad.

##### Plate XLVII, Fig. 6.

*Buccinum multirugatum* Conrad, 1841, Amer. Jour. Sci, vol. xli, p. 345.

*Tritia multirugata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

*Tritia multirugata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Ptychosalpinx multirugata* Gill, 1867, Amer. Jour. Conch., vol. iii, p. 154.

*Ptychosalpinx multirugata* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 262.

*Ptychosalpinx multirugata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 237.

*Cominella (Ptychosalpinx) multirugata* Cossmann, 1901, Essais de Paléoconch. Comp., vol. iv, p. 151.

*Description*.—"Ovato-conical, with numerous wrinkled spiral lines, coarser and more distant near the suture and at base of the body whirl; base bicarinated and subumbilicated; columella with a thick fold at base." Conrad, 1841.

This is the rarest species of *Ptychosalpinx* from the Maryland Miocene. When more material is collected it will probably be found to grade into the *lienosa-fossulata* series.

Length, 36 mm.; diameter, 22 mm.

*Occurrence*.—CHOPTANK FORMATION. Dover Bridge. CALVERT FORMATION. Plum Point.

*Collection*.—U. S. National Museum.

#### PTYCHOSALPINX LIENOSA Conrad.

##### Plate XLVIII, Fig. 7.

*Buccinum lienosum* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 308.

*Buccinum bilix* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 308. (In part).

*Buccinum fossulatum* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 308.

*Tritia fossulata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

*Tritia fossulata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Ptychosalpinx fossulata* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 262.

*Ptychosalpinx lienosa* Conrad, 1868, Amer. Jour. Conch., vol. iii, pp. 262, 263, pl. xix, fig. 9.

*Ptychosalpinx fossulata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 237.

*Ptychosalpinx lienosum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 237.

*Cominella* (*Ptychosalpinx*) *lienosa* Cossmann, 1901, Essais de Paléoconch. Comp., vol. iv, p. 151.

*Description*.—"Obovate, with distant spiral flattened, not very prominent lines, between which are usually 3 lines, the middle one largest; whorls of the spire slightly convex; body whorl ventricose; lines of growth distinct; columella with two distant plaits, the inferior one at the angle which is prominent." Conrad, 1843.

It seems highly probable that when more material belonging to this genus is collected from the Calvert formation, this species will be found to be connected with *P. multirugata* by such a complete gradation series that but a single species can be recognized. Then both *fossulata* and *lienosa* will have to be considered synonyms of *multirugata*, or else *lienosa* used as a variety.

Length, 45 mm.; diameter, 26 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Philadelphia Academy of Natural Sciences.

### ? Family NASSIDÆ.

? Genus ILYANASSA Stimpson.

Subgenus PARANASSA Conrad.

### ILYANASSA? (PARANASSA) PORCINA (Say).

#### Plate XLVIII, Figs. 8, 9.

*Buccinum porcinum* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 126, pl. vii, fig. 3. (Reprint, Bull. Amer. Pal., No. 5, 1896, p. 32, pl. vii, fig. 3.)

? *Buccinum aratum* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 126, pl. vii, fig. 4. (Reprint, Bull. Amer. Pal., No. 5, 1896, p. 33, pl. vii, fig. 4.)

*Buccinum porcinum* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 19, pl. iv, fig. 4.

*Buccinum porcinum* Tuomey and Holmes, 1857, Pleiocene Fossils of South Carolina, p. 133, pl. xxviii, fig. 1.

*Buccinum porcinum* Emmons, 1858, Report N. Car. Geol. Survey, p. 256, fig. 122.

*Tritia porcina* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

? *Tritia arata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

*Tritia porcina* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

? *Tritia ovata* Meek, 1864, Miocene Check List, Smith. Misc. Coll., (183), p. 20. (No. 668, not No. 689.)



? *Tritia arata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Ptychosalpinx porcina* Gill, 1867, Amer. Jour. Conch., vol. iii, p. 154.

*Ptychosalpinx* (*Paranassa*) *porcina* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 262.

? *Ptychosalpinx* (*Paranassa*) *arata* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 262.

*Ilyanassa* (*Paranassa*) *porcina* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 238.

*Description*.—"Subovate, acute, slightly undulated, and spirally striated; labrum toothed.

"*Shell* with numerous, subequal, slight undulations, disappearing on the body whorl, and about seventeen transverse, little elevated striæ: *whorls* nearly six, but little convex: *suture* very narrow, consisting of a mere indented line: *apex* acute: *aperture* moderate, rather more than half the length of the shell: *labium* covering the columella, concave: *labrum* not thickened; on the inner submargin with striæform teeth.

"Length one inch and a quarter, breadth rather more than three-fourths of an inch.

"This is shorter than the *reticosum* of Sowerby, the suture is not so deeply impressed, the undulations are not so obvious, and the concavity of the labium is much more profound." Say, 1824.

Say and Dall are the only ones who have recorded *porcina* or *arata* from Maryland, and Dall gave them on the authority of Say. It is of course possible that Finch found them while all later collectors have missed them. But considering the amount of material collected since then, it seems more probable either that Finch's specimens (of these species) came from Virginia, or that Say's figures are extremely bad representations of aberrant forms of the species here and by Dall referred to *Ptychosalpinx altilis* Conrad. Say's figure of *arata* is extremely bad in any case, and because of this reason and of the possibilities stated above, the references to *arata* are with query grouped in the above synonymy under *porcina*.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River(?).

### Family NASSIDÆ.

Genus NASSA Lamarck.

NASSA CALVERTENSIS n. sp.

Plate XLIX, Fig. 1.

*Description*.—Shell short, globose, six-whorled; body whorl large, rotund, or with a subangular shoulder; about 25 closely-set raised re-

volving lines with narrower interspaces and 25 curved longitudinal ribs on the body whorl; varices  $270^{\circ}$  apart, earlier ones obsolete; mouth subquadrate; anterior canal broad and short; labium with a thick callosity; columella very concave, with a sharp plait at the base, a large tooth immediately above the plait and a small tooth in the center of the concavity; labrum thick, lirate; spire short but sharp with concave sides; whorls of the spire with more angular shoulder and stronger longitudinal ribs than the body whorl.

Length, 8 mm.; diameter, 6 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

#### NASSA GUBERNATORIA n. sp.

Plate XLIX, Fig. 2.

*Description*.—Shell small, slender, thick, seven-whorled, body whorl with about 15 broad, uniform, raised, revolving lines with interspaces half as wide, and very faint irregular longitudinal undulations; mouth small; anterior canal broad and very short; labium strongly callous, with a large tooth at the top; labrum very thick, with about five strong lirations extending far in.

Length, 9 mm.; diameter, 4 mm.

*Occurrence*.—CHOPTANK FORMATION. Governor Run (lower bed).

*Collection*.—Maryland Geological Survey.

#### NASSA TRIVITTATOIDES (Whitfield).

Plate XLIX, Figs. 3, 4.

*Tritia trivittatoides* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 104, pl. xix, figs. 1-3.

*Tritia trivittatoides*, var. *elongata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 105, pl. xix, figs. 4-6.

*Description*.—"Shell small, elongate-ovate or pupæform, not exceeding half an inch in total length, and few examples reaching that size. Whorls about seven in number, including the mammillar apical one, convex and moderately increasing in diameter with increased number; sutures distinct but not channeled or grooved. Aperture less than one-third of the entire length, the outer lip thickened and varix-like exter-

nally, and somewhat also internally, and marked by several tooth-like lines on the inner side. Inner lip also distinct and somewhat thickened with several tooth-like striæ, the posterior end of the aperture being slightly channeled and the front strongly so; beak distinctly constricted at its junction with the body whorl. Surface granularly cancellated with nearly direct vertical lines or ridges and raised spiral lines, forming granules or asperities at their intersection, and the last whorl having a single lip-like varix. Spiral lines eight or nine in number on the body whorl, and the vertical lines eighteen or twenty, exclusive of the lip and varix. Volutions above the last not possessing lip-like varices." Whitfield, 1894.

Whitfield described the variety *elongata* as follows:

"A number of specimens of full growth, having many of the features of *T. trivittatoides* above described, occur in the collection. They vary from one-fourth of an inch to five-sixteenths of an inch in length, and are proportionally much more slender than are those of that species. They also possess a greater number of vertical lines, and two additional spiral lines on the body whorl. The surface features are much like those of that species, but on many of them the spiral lines are more distinctly raised ribs, and the line of nodes below the suture more distinctly separated from and proportionally larger than those below. The thickened outer lip is the same as on that shell, as also is the lip-like varix within the limit of the body whorl, but the teeth-like ridges on the columella and on the inside of the outer lip appear on most specimens somewhat stronger in proportion to the size of the shell, while the proportional length of the spire, as compared to that of the body whorl, is considerably greater. These features are so marked as to render it unsafe to include these specimens under the same specific head with *T. trivittatoides*." Whitfield, 1894.

It is impossible to decide definitely here of the value of the *var. elongata* for the New Jersey fossils. The differences upon which it was established appear to be slight and the Maryland specimens which apparently represent both forms cannot be divided.

Length (restored), 14 mm.; diameter, 6 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

*NASSA GREENSBOROËNSIS* n. sp.

Plate XLIX, Figs. 5a, 5b.

*Description*.—Shell small, narrow, elongate, six-whorled; whorls convex, separated by very distinct sutures; sculptured by faint longitudinal undulations which are overridden by about ten fine spiral striæ on each whorl; striæ separated by interspaces of the same width as the striæ; aperture broadly ovate; outer lip with four beads.

Length, 7 mm.; diameter, 3.3 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro.

*Collection*.—Maryland Geological Survey.

*NASSA MARYLANDICA* n. sp.

Plate XLIX, Figs. 6, 7, 8.

*Description*.—Shell small, solid, elongate (except as noted below), eight-whorled; body whorl with 9 to 15 distant raised longitudinal ribs which extend to the suture without any constriction or subsutural tubercles, and with 25 to 30 faint revolving lines of uniform strength which never override the ribs; whorls of the spire with about 10 revolving lines.

This species differs from *N. peralta*, with which it is associated, in being generally smaller (and more elongated), in having a less distinct suture, in having constantly fewer and more distant ribs which are never overridden by the revolving lines and which extend from suture to suture without constriction.

Associated with this species are two forms which further study may show to be entitled to separate names, but at present it seems best to include them here as aberrant forms of this species. One is very short and globose (fig. 8), while the other has a distinct notch near the lower end of the labrum (fig. 7). Otherwise they have all the characteristics of this species.

Length, 14 mm.; diameter, 6 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science.

## NASSA PERALTA (Conrad).

## Plate XLIX, Figs. 9, 10.

*Nassa trivittata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Buccinum trivittatum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 186.

*Buccinum trivittatum* Lyell, 1845, Quart. Jour. Geol. Soc. London, vol. i, p. 421.

*Buccinum trivittatum* Lyell, 1846, Proc. Geol. Soc. London, vol. iv, p. 555.

*Tritia trivittata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Ptychosalpinx* (*Tritiaria*) *peralta* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 264, pl. xix, fig. 5.

*Ptychosalpinx* (*Tritaria*) *peralta* Tryon, 1882, Manual of Conchology, vol. iv, p. 8, pl. iii, fig. 31.

*Nassa trivittata* Heilprin, 1884, U. S. Tertiary Geology, pp. 58, 61.

*Nassa* (*Tritia*) *trivittata* Clark, 1888, Johns Hopkins Univ. Circ., vol. vii, p. 66.

*Nassa trivittata* Clark, 1891, Johns Hopkins Univ. Circ., vol. x, p. 107.

*Nassa peralta* Harris, 1891, Amer. Geol., vol. viii, p. 174.

*Description*.—"Elongate turritid, whorls 8, longitudinally ribbed and with revolving impressed lines, about 5 in number on the penultimate volution; above near the suture on all the whorls there is a broader impressed line, which divides the ribs and forms a tuberculous ridge around the summits of the whorls; ribs narrow, numerous; spire acuminate." Conrad, 1868.

The body whorl is often much more expanded than any of the other whorls. The number of ribs on the body whorl (20-25) is characteristic of the species. The suture is deeply impressed.

The synonymy of this species has been the subject of an article by Professor Harris (see above), in which the bibliographic history of the species has been discussed in great detail.

Length, 20 mm.; diameter, 9 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University, Wagner Free Institute of Science.

## NASSA PERALTOIDES n. sp.

## Plate XLIX, Fig. 11

*Description*.—Shell small, six-whorled; whorls gently convex; suture very distinct; labium with a thick callosity and with a tooth at the upper



end; labrum sometimes lirate; body whorl with eighteen longitudinal ribs terminating in a subsutural row of tubercles, and with about sixteen sharply impressed spiral lines with much broader interspaces, the spiral lines (except the subsutural one) not crossing the longitudinal ribs; spire regularly pyramidal.

This species most closely resembles *N. peralta*, of which it is probably the ancestor. It differs from it in being much smaller, in having a less expanded mouth, and in not having the longitudinal ribs crossed by the spiral lines.

Length, 11 mm.; diameter, 5.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), Greensboro, Trappe Landing. CALVERT FORMATION. Plum Point, Church Hill, Fairhaven.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, U. S. National Museum.

#### NASSA TRIVITTATA Say.

Plate XLIX, Fig. 12.

*Nassa trivittata* Say, 1822, Jour. Acad. Nat. Sci. Phila, vol. ii, 1st ser., p. 231.

This species has been repeatedly listed from the Miocene of Maryland, but it has been supposed that in every case it was a misdetermination of *Nassa peralta* Conrad. The Johns Hopkins collection contains 8 undoubted specimens of this species which were in a tray of *N. peralta* from St. Mary's river. Probably they came from the Pleistocene at Cornfield Harbor (where they occur abundantly), and were mixed with the Miocene specimens by accident. Several quarts of specimens of *N. peralta* collected by the Maryland Geological Survey and by the Cornell and Wagner Institute expeditions have been carefully searched without finding a single specimen of *N. trivittata*. In all probability the species is entirely post-Miocene. It is hoped that future collectors will give this question their careful attention.

*Occurrence*.—ST. MARY'S FORMATION (?). St. Mary's River (?).

*Collection*.—Johns Hopkins University.

Genus BULLIOPSIS Conrad.

## BULLIOPSIS INTEGRA Conrad.

Plate L, Figs. 1, 2.

- Buccinum integrum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 194, pl. ii, fig. 5.  
*Buccinum pusillum* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 12.  
*Buccinum pusillum* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 272, pl. 37.  
*Bullia* (*Bulliopsis*) *ovata* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 287.  
*Tritia* (*Bulliopsis*) *integra* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.  
*Tritia* (*Bulliopsis*) *ovata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.  
*Tritia* (*Bulliopsis*) *integra* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.  
*Tritia* (*Bulliopsis*) *ovata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.  
*Nassa* (*Bulliopsis*) *integra* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 66, pl. iii, fig. 5.  
*Nassa* (*Bulliopsis*) *integra* var. *ovata* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 66, pl. iii, fig. 4.  
*Melanopsis integra* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 259.  
*Buccinanops variabilis* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 107, pl. xvii, figs. 13-18.

*Description*.—"Shell short, subfusiform or elliptical; smooth; destitute of ribs or striæ; spire conical, the volutions convex; aperture elliptical, about half the length of the shell; columella thick; labium reflected." Conrad, 1842.

Whitfield named some young shells from the St. Mary's formation in a deep well at Cape May, "*Buccinanops variabilis*," describing the species as follows:

"Shell rather small, not exceeding five-eighths of an inch in total length; the body of a somewhat subcylindrical form, sometimes wider below than above, and sometimes the reverse; spire short-obtuse, or sub-turreted; volutions of the spire round scalariform, with deep distinct sutures, the apical ones often quite pointed and attenuated, with a small, rounded, mammillary nucleus; aperture from half to three-fourths as long as the shell, according to the length of the spire, channeled at each extremity and constricted just below the suture on the body whorl, leaving the upper edge of the volution protruding fold-like, the lip expanding again below; inner lip extending upon the inner volution, forming a

callosity which is thickened above, bordering the posterior canal; lower canal channeling the base of the columella within. Surface smooth, polished when entire, but generally eroded, showing under a glass fine lines of growth." Whitfield, 1894.

His specimens do not differ at all from young of *B. integra* from the Maryland localities.

Length, 23 mm.; diameter, 12 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point, St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

#### BULLIOPSIS QUADRATA Conrad.

Plate L, Fig. 3.

*Nassa quadrata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., pp. 211, 226, pl. ix, fig. 16.

*Buccinum quadratum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Bullia (Bulliopsis) quadrata* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 287.

*Tritia (Bulliopsis) quadrata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 563.

*Tritia (Bulliopsis) quadrata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Nassa (Bulliopsis) quadrata* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 65, pl. iii, fig. 1.

*Nassa (Bulliopsis) subcylindrica* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 66.

*Melanopsis quadrata* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 259.

*Description*.—"Shell turreted; spire with the whorls rather square, and slightly projecting at the angles; left lip reflected over the columella, and thickened above." Conrad, 1830.

Length, 23 mm.; diameter, 1 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

#### BULLIOPSIS MARYLANDICA Conrad.

Plate L, Fig. 4.

*Bullia (Bulliopsis) Marylandica* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 287.

*Tritia (Bulliopsis) Marylandica* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 562.

*Tritia (Bulliopsis) marylandica* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.

*Nassa (Bulliopsis) Marylandica* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 65, pl. iii, fig. 3.

*Melanopsis Marylandica* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 259.

*Description*.—"Oblong-ovate, entire; whorls 6, slightly convex or sub-truncated laterally; suture impressed; aperture about half the length of the shell; columella profoundly callous above, the callus extending beyond the lip." Conrad, 1862.

The surface is frequently marked with obsolete revolving lines.

Length, 32 mm.; diameter, 14 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point,

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences.

### Family COLUMBELLIDÆ.

Genus COLUMBELLA Lamarck.

Subgenus ASTYRIS Adams.

### COLUMBELLA (ASTYRIS) COMMUNIS (Conrad).

Plate L, Figs. 5, 6, 7.

*Nassa lunata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.  
(Not of Say.)

*Buccinum lunatum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Amycla (Astyris) communis* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 287.

*Amycla (Astyris) communis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 564,

*Columbella (Astyris) communis* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 138.

*Astyris communis* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 28.

*Amycla communis* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 110, pl. xix, figs. 12-15.

*Description*.—"Small, whorls six or seven, smooth and polished; spire rather elevated; body whorl abruptly rounded in the middle, or subangular; submargin of labrum minutely dentate." Conrad, 1862.

Whorls slightly convex, covered with minute spiral lines visible only through a lens; beak with from 8 to 12 distinct impressed revolving lines; labrum sometimes straight, sometimes rounded; usually smooth within, often strongly dentate; labium usually somewhat callous, sometimes dentate. The callous dentate labrum occurs only in specimens from the St. Mary's Formation and most typically in those from Cove Point.

There occurs rather abundantly at Greensboro in association with this species a small form ranging in length from 2.5 mm. to 3.5 mm. This may represent *C. lunata* (Say), which has not hitherto been recognized in the Miocene of this region.

Length, 14 mm.; diameter, 6 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), Greensboro. CALVERT FORMATION. Plum Point, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

#### COLUMBELLA CALVERTENSIS n. sp.

Plate L, Fig. 8.

*Description*.—Shell thick, elongate, eight-whorled; spire elevated; whorls slightly convex; body whorl with about twenty-four narrow revolving grooves with flat interspaces about four times as wide; whorls of the spire with about six grooves; lines of growth very faint; mouth narrow; labrum thick, with about fourteen coarse teeth; canal short, slightly curved.

Length, 16 mm.; diameter, 6.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—U. S. National Museum, Maryland Geological Survey.

#### Family MURICIDÆ.

Genus MUREX Linné.

Subgenus PTERORHYTIS Conrad.

#### MUREX (PTERORHYTIS) CONRADI Dall.

Plate L, Figs. 9a, 9b.

*Cerostoma umbrifer* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, expl. pl. xxviii, fig. 14. (Not p. 141.)

*Murex (Pterorhytis) Conradi* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 143, pl. xii, fig. 11.

*Ocenebra (Pterorhytis) conradi* Cossmann, 1903, Essais de Paléonconch. Comp., vol. v, p. 43, fig. 3.



*Description*.—"This fine species has, like most of the species of this genus, only four varices. The spire is much shorter than in *M. umbrifer* and the form of the varices is different." Dall, 1890.

Shell of moderate size, very solid, five-whorled; varices four, broad, thick, reflexed, intervarical spaces with low, rounded, revolving ribs, and distant obscure lines of growth; central part of the whorl strongly carinated; face of the last varix with wavy lines caused by the edges of the laminæ; umbilicus small; canal barely closed, slightly reflexed.

Length, 36 mm.; diameter, 25.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collection*.—U. S. National Museum.

Genus TYPHIS Montfort.

TYPHIS ACUTICOSTA Conrad.

Plate LI, Figs. 1, 2, 3.

*Murex acuticosta* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., pp. 211, 217, pl. ix, fig. 1.

*Typhis acuticosta* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Typhis acuticosta* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 83, pl. xlviii, fig. 1.

*Typhis acuticosta* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Typhis acuticosta* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Typhis acuticostata* Conrad, 1868, Amer. Jour. Conch., vol. iv, p. 64, pl. v, fig. 6.

*Typhis acuticosta* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 151.

*Murex acuticostata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 30.

*Description*.—"Shell with four or five acute foliated varices ending above in a pointed, compressed spire, alternating with four shorter rounded varices ending above in a tube; aperture oval and entire; margin reflected; beak closed, and slightly recurved." Conrad, 1830.

Length, 21 mm.; diameter, 11 mm.

The form from Plum Point may be a distinct variety or species. It is very elongate, having a six-whorled spire and long spines and canal.

Length, 18 mm.; diameter, 8.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Cornell University, U. S. National Museum.

Genus MURICIDEA Swainson.

MURICIDEA SHILOHENSIS (Heilprin).

Plate LI, Figs. 4, 5, 6.

*Murex Shilohensis* Heilprin, 1887, Proc. Acad. Nat. Sci. Phila., vol. xxxix, p. 404.

*Murex shilohensis* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 141.

*Murex Shilohensis* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 97, pl. xvii, fig. 1.

*Description.*—"Whorls about seven, angular, flattened on the shoulder, which is crossed diagonally by the variceal ridges; varices about eight on the body-whorl, sub-equal, spinosely elevated on the shoulder angulation, and crossed by four sub-equal revolving ridges, which appear double on the crests of the varices; only two such ridges on the whorls above the body-whorl.

"Aperture somewhat more than half the length of shell, key-hole shaped, with the canal broadly deflected. Length nearly .75 inch." Heilprin, 1887.

Dr. Dall notes that the type of this species is suspiciously like *Muricidea spinulosa*.

Length, 17 mm.; diameter, 9 mm.

*Occurrence.*—CALVERT FORMATION. Plum Point.

*Collections.*—Maryland Geological Survey, Cornell University, U. S. National Museum.

Genus TROPHON Montfort.

TROPHON TETRICUS Conrad.

Plate LI, Figs. 7a, 7b.

*Fusus tetricus* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 18, pl. iii, fig. 6.

*Fusus tetricus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Fusus tetricus* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 84, pl. xlviii, fig. 4.

*Trophon tetricus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Trophon tetricus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Description.*—"Fusiform; with longitudinal acute ribs, terminating above in short spines; whorls angular and flattened above; beak long and recurved." Conrad, 1832.

A feature which Conrad does not mention in his descriptions, but which shows distinctly, is the occurrence of three or four raised revolving ribs on the body whorl.

The shell is seldom perfect, the spines and the long beak being very easily broken off. The number of varices on the body whorl varies from 9 to 12.

Length, 18 mm.; diameter, 8 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Cornell University.

TROPHON TETRICUS VAR. LÆVIS n. var.

Plate LI, Fig. 8.

*Fusus tetricus* Conrad (In part).

*Description*.—Shell six-whorled; body whorl with 9 to 13 varices; lower part of the body whorl almost or quite smooth, one of the four revolving ribs of *T. tetricus* sometimes faintly showing.

Conrad's description of *T. tetricus* applies exactly to this variety; but his figures show the character by the lack of which this variety is distinguished, i. e., four raised revolving ribs on the body whorl.

Length (restored), 27 mm.; diameter, 12 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University.

TROPHON CHESAPEAKEANUS n. sp.

Plate LI, Figs. 9, 10.

*Description*.—Shell small, fusiform, six-whorled; spire elongate, pyramidal; body whorl much expanded above, constricted below into a long, narrow beak; shoulder of the whorl with about sixteen obtuse elongated nodes which die out immediately above the shoulder, leaving a smooth, slightly concave subsutural constriction; mouth wide, contracted suddenly below into a narrow, somewhat reflexed canal; columella bent near the lower end of the mouth, and somewhat callous at the angle; lines of growth irregular.

This species is very abundant at the St. Mary's River. At Plum Point a small, very elongated variety occurs.

Length, 10 mm.; diameter, 5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Langley's Bluff. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science, Cornell University.

TROPHON SP.

A single specimen of Trophon was found at Greensboro which does not belong to either of the afore-described species, but as the specimen is immature it will not be given a name.

The specimen possesses five whorls. The body whorl has seven varices and has about twelve revolving ribs distributed from the shoulder to the base of the beak.

Length, 8 mm.; diameter, 4 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro.

*Collection*.—Maryland Geological Survey.

Genus SCALASPIRA Conrad.

The name *Scalaspira* was used by Conrad in 1862 and subsequently by Meek in 1864 in their Check Lists. Each time it was used as a subgenus under *Fusus*; and neither time was the subgenus defined. *Fusus strumosus* Conrad was the only species included under it. As this species is surely not a true *Fusus* and cannot be with certainty assigned to any other genus, the name may be retained for a new genus defined as follows:

Shell fusoid, with angular cancellated whorls; anterior canal long, narrow; columella bent at the beginning of the canal, and somewhat callous; nucleus depressed, with faint revolving ridges and transverse striations.

Type *Fusus strumosus* Conrad.

Fischer considers *Scalaspira* a synonym of *Hanetia* of Jousseume which he places as closely related to *Urosalpinx*, while Tryon and Cossman consider it a synonym of *Urosalpinx*.

SCALASPIRA STRUMOSA Conrad.

Plate LI, Figs. 11, 12, 13.

*Fusus strumosus* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 18, pl. iii, fig. 4.

*Fusus strumosus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Fusus strumosus* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 85, pl. xlix, fig. 3.

*Fusus (Scalaspira) strumosus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Fusus (Scalaspira) strumosus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (188), p. 22.

*Urosalpinx strumosus* Tryon, 1880, Manual of Conchology, vol. ii, p. 152, pl. lxx, fig. 431.

*Urosalpinx strumosus* Cossmann, 1903, Essais de Paléoconch. Comp., vol. v, p. 49.

*Description*.—"Fusiform; cancellated; body whorl subquadrangular, with revolving tuberculated ribs, alternated in size; whorls of the spire striated, and tuberculated at the angle; beak straight." Conrad, 1832.

Length, 26 mm.; diameter, 13 mm. (specimen from Yorktown, Va.).

Length, 18 mm.; diameter, 9 mm. (specimen from Cove Point, Md.).

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

#### Genus UROSALPINX Stimpson.

#### UROSALPINX CINEREUS (Say) ?

#### Plate LI, Figs. 14, 15.

*Fusus cinereus* Say, 1822, Jour. Acad. Nat. Sci. Phila., vol. ii, 1st ser., p. 236. (Fig'd. 1830, Amer. Conch., pl. xxix.)

*Fusus cinereus* var. Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 129, (Reprinted, 1896, Bull. Amer. Pal., No. 5, p. 35.)

Not *Fusus cinereus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., pp. 211, 223.

*Fusus cinereus* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 19, pl. iv, fig. 3.

*Fusus cinereus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 183, 187.

? *Urosalpinx cinereus* Meyer, 1888, Proc. Acad. Nat. Sci. Phila., vol. xl, p. 170.

*Description*.—"Volutions cancellate, the transverse costæ eleven, robust; revolving lines filiform, irregularly alternately smaller, crenulating the edge of the exterior lip, which is acute, and alternating with the raised lines of the fauces; fauces tinged with chocolate colour; beak short, obtuse, not rectilinear; labrum not incrassated." Say, 1822.

The fossil which is here referred to *cinereus* often differs considerably from the typical specimens of that form in proportional length, character of sculpture, and straightness of beak; but it nevertheless grades into it so that a consistent separation is impossible. On the other hand the separation from its stratigraphic associate, *U. rustica*, though sometimes difficult, is much more distinct.



The St. Mary's fossil which Conrad referred to *cinereus* (*Fusus cinereus* Conrad, 1830) must from its size have been *Buccinofusus parilis*, then unnamed by him. There is considerable doubt as to the identity of the Miocene fossils referred by Say and by Meyer to *cinereus*.

Length, 38 mm.; diameter, 40 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point. CHOPTANK FORMATION. Jones Wharf.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science.

### UROSALPINX RUSTICUS (Conrad).

Plate LI, Figs. 16, 17.

*Fusus errans* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 223, pl. ix, fig. 2. (Not *F. errans* Sowerby.)

*Fusus rusticus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 230.

*Fusus rusticus* Conrad, 1832, Fossil Shells of the Tertiary, No. 1, p. 18, pl. iv, fig. 1.

*Fusus rusticus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 185, 187.

*Fusus subrusticus* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 84, pl. xlviii, fig. 5.

*Neptunea rustica* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 560.

*Neptunea rustica* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 22.

*Siphonalia rustica* Conrad, 1869, Amer. Jour. Conch., vol. iv, p. 249.

*Urosalpinx trossulus* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 148. (In part.)

*Fusus rusticus* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xiv, p. 30.

*Streptochetus rusticus* Cossmann, 1901, Essais de Paléoconch. Comp., vol. iv, p. 30, pl. iv, fig. 20.

*Description*.—"Shell subfusiform, transversely striated, with short longitudinal ribs or undulations on the large whorl; spire conical, costated; upper part of the whorls concave and plain; right lip toothed within, and plicated on the margin; beak recurved. The striae in general are alternately larger and smaller." Conrad, 1830.

Length, 42 mm.; diameter, 24 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Cornell University, U. S. National Museum.

## Family PURPURIDÆ.

## Genus ECPHORA Conrad.

*Ecphora* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 310.

? *Stenomphalus* Sandberger, 1853.

*Ecphora* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 75.

*Rapana* Tryon, 1882, Manual of Conchology, vol. ii, p. 202. (In part.)

*Stenomphalus* Zittel, 1885, Handbuch der Paleontologie, Abth. 12, p. 270. (In part.)

*Rapana* Fischer, 1887, Manuel de Conchyliologie, p. 644. (In part.)

*Ecphora* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 124.

*Rapana* Cossmann, 1903, Essais de Paléoconch. Comp., vol. v, p. 63.

Careful study of large collections of material from the entire Atlantic slope has shown that this genus, formerly considered as most constant in its characteristics and most easy to recognize, should really be divided into several distinct species, the generic position of some of which are not at first sight apparent.

The difficulty encountered in assigning these forms to a satisfactory generic position can be seen from the great diversity of opinion already recorded in the synonymy of the genus itself and in that of the several species. This diversity of opinion becomes more evident when one notes the different positions assigned to the various genera in which the species have been included.

The recognition of *tampaënsis* as a member of the genus makes it very evident the genus itself belongs to the *Purpuridæ* and is very closely related to *Rapana*, rather than to the *Fusidæ*.

The European species "*Pyrula*" *jauberti* Grateloup from the Tertiary of Bordeaux, and "*Trophon*" *cancellata* Thomæ from the Tertiary of Mainz have been referred to this genus.

## ECPHORA QUADRICOSTATA (Say).

## Plate LII, Figs, 1, 2, 3.

————— Lister, 1685, Historia Conchyliorum, pl. 1059, fig. 2.

*Buccinum scala* Dillwyn, 1823, Index of 3rd Edit. of Lister's Historia Conchyliorum.

*Buccinum scala* ? var. Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 128.

*Fusus 4-costatus* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 127, pl. vii, fig. 5. (Reprinted, 1896, Bull. Amer. Pal., No. 5, p. 33, pl. vii, fig. 5.)

*Fusus quadricostatus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Fusus quadricostatus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187 (not p. 185).

*Ecphora quadricostata* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 310.

- Colus quadricostatus* Tuomey and Holmes, 1857, Pleiocene Fossils of South Carolina, p. 149, pl. xxx, fig. 4.
- Fusus quadricostatus* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 250, fig. 10.
- Ephora quadricostata* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 83, pl. xlviii, fig. 2.
- Ephora 4-costatus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 563.
- Ephora quadricostata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 20.
- Rapana quadricostata* Tryon, 1882, Manual of Conchology, vol. iv, p. 202, pl. lxii, fig. 341.
- Ephora quadricostata* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 125.
- Ephora quadricostata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 28. (Not pp. 24, 27.)
- Rapana (Ephora) quadricosta* Cossmann, 1903, Essais de Paléconch. Comp., vol. v, p. 64, pl. iii, fig. 14.

*Description*.—"Ovate-ventricose; with a dilated umbilicus, and four much elevated belts, which are more dilated at their tops.

"*Spire* short, the volutions with but two belts, the others being concealed by the succeeding whorls: *body whorl* with four belts, which are equidistant, much elevated, wider at top than at the junction with the whorl, and with one or two deeply impressed lines; intervening spaces wrinkled, the wrinkles extending over the belts: *aperture* suboval: *canal* short and contracted: *labrum* with a groove corresponding with each of the exterior ribs: *umbilicus* dilated, large, not visibly penetrating to the inner summit; the exterior margin prominent and deeply dentated." Say, 1824.

The essential characters of this species as here restricted are: four revolving costæ, which in the adult are of equal prominence and T-shaped in cross section. The adult is more depressed than the young, and with this depression comes the flattening of the costæ, the flaring of the umbilicus, and a looser coiling of the whorls.

This species is apparently the only one at Cove Point and St. Mary's River and in the states south of Maryland. It has not been found at other Maryland localities than those mentioned above. Tuomey and Holmes' figure is so imperfect that it is impossible to state whether it represents the typical form of the species or the following variety.

Length, 120 mm.; diameter, 105 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

## ECPHORA QUADRICOSTATA VAR. UMBILICATA (Wagner).

## Plate LII, Fig. 4.

*Fusus umbilicus* Wagner, 1839, Plate 2, fig. 2.

*Fusus quadricostatus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 185.

*Fusus quadricostatus* Bronn, 1848, Hand. Gesch. Nat., Index Pal., pt. i, p. 517.

*Fusus quadricostatus* var. *umbilicatus* Bronn, 1849, Hand. Gesch. Nat., Index Pal., pt. ii, p. 455.

*Ecphora quadricostata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 27. (Not pp. 24, 28.)

*Ecphora quadricostata* var. Dall, 1898, Trans. Wagner Free Inst. Sci., vol. v, No. 2, p. 9.

*Description*.—This variety differs from the typical forms of the species in having a thinner shell, a more flaring umbilicus, more loosely coiled whorls, and ribs which are not T-shaped. Because of the thinner shell, the looser coiling, and the lithologic character of the formation in which the variety occurs, perfect specimens are far rarer than those of the typical *quadricostata* and the distinctness of the variety has not been generally recognized. The figure prepared by Wagner in 1839 was on one of those plates which were not regularly published until 1898, but of which a few copies were distributed with manuscript names attached.<sup>1</sup> Apparently no description of *var. umbilicata* has ever been published till now.

There are specimens of this variety in the National Museum from Alum Bluff, Fla. (upper bed).

Length, 70 mm.; diameter, 60 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Dover Bridge, 2 miles south of Governor Run (lower bed), Governor Run (lower bed), Flag Pond, Pawpaw Point, Governor Run (upper bed), Greensboro, Cordova.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, U. S. National Museum.

## ECPHORA TRICOSTATA n. sp.

## Plate LII, Figs. 5, 6, 7, 8.

*Description*.—Shell of moderate size, thin, chitinous, loosely coiled, six-whorled; nucleus smooth, elevated, conical, three-whorled; spire sharp,

<sup>1</sup> Dall, Trans. Wagner Free Inst. Sci., vol. v, No. 2, p. 9.

closely wound on the lower and smaller of three prominent elevated revolving ribs; longitudinal wrinkles most prominent on the early whorls; body whorl large, with three very prominent elevated revolving ribs with a fourth rudimentary one below it on the largest specimens; spaces between the elevated ribs and below them with many impressed revolving lines between which the surface is gently convex; umbilicus widely flaring in the largest specimens, almost absent in the young.

Length, 40 mm.; diameter, 36 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Truman's Wharf, Chesapeake Beach, 3 miles south of Chesapeake Beach, Fairhaven, White's Landing.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

#### ECPHORA TAMPAËNSIS (Dall).

Plate LII, Figs. 9, 10.

*Rapana tampaënsis* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 153.

*Rapana tampaënsis* var ? Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 244, pl. xx, fig. 14.

*Fasciolaria (Lyrosoma) sulcosa* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 100, pl. xvii, figs. 9, 10. (Not of Conrad.)

*Rapana (Ecpchora) tampaënsis* Cossmann, 1903, Essais de Paléoconch. Comp., vol. v, p. 65.

*Description*.—"Shell rather small, short-spined; last whorl much the largest; spiral sculpture of eight or nine primary ridges, elevated and square-sided, of which one is near the suture, two others (a little larger) with subequal interspaces in front of the first, then an interspace of greater width with the strongest spiral in front of it, then the peripheral interspace, twice as wide as the strongest spiral, then another strong spiral followed by a narrower channel, and three more basal spirals with diminishing interspaces on the base, and three or four rather obscure and less elevated spiral cords on the canal; of secondary spirals much smaller than the primaries, there are one or two in the wide peripheral channel, and sometimes a single one elsewhere; lastly, the whole surface is more or less sculptured by fine, incised spiral lines. The transverse sculpture is of fine wrinkles, in harmony with the incremental lines, which cover most of the shell; the ribs are slightly but irregularly undulated in some places; aperture ovate, pillar-lip with a thin, smooth callus; edge of the outer lip undulated by the sculpture, the interior lirated, with about ten sharp,



prominent liræ disposed somewhat in pairs; canal very narrow and deep, shorter than the aperture, umbilicus flaring, variable in diameter, deep, bounded by the rounded edge of the fasciole, within axially striated, but not otherwise sculptured. Lon. of shell —(?); of last whorl from the suture at the aperture forward 20.0; diam. of last whorl 21.5; of the umbilicus in two specimens 5.0 and 6.5 mm. respectively." Dall, 1890.

The variation which this species shows is amazing. In the material from Jones Wharf there are forms which one could hardly hesitate to refer to *Ecphora quadricostata*. These, by an increasing uniformity in the prominence of the ribs, a narrowing of the umbilicus, and the gradual appearance and increasing prominence of internal liræ on the labrum, grade into forms like that from Church Hill which Dall figured as *Rapana tampaënsis*. Another gradation consists in the appearance of a small fold on the columella. It was a specimen with this characteristic which Whitfield referred to *Fasciolaria (Lyrosoma) sulcosa*. In other specimens the ribs have become somewhat obsolete.

Length, 38 mm.; diameter, 25 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Dover Bridge, Pawpaw Point, Trappe Landing. CALVERT FORMATION. Church Hill, Plum Point (?).

*Collections*.—Maryland Geological Survey, U. S. National Museum.

### Family CORALLIOPHILIDÆ.

Genus CORALLIOPHILA Adams.

#### CORALLIOPHILA CUMBERLANDIANA (Gabb).

Plate LI, Figs. 18, 19, 20.

*Cantharus Cumberlandiana* Gabb, 1860, Jour. Acad. Nat. Sci. Phila., 2nd ser., vol. iv, p. 375, pl. lxxvii, fig. 6.

*Cronia ? tridentata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 563. (In part. Not *Purpura tridentata* T. and H.)

*Coralliophila cumberlandiana* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 130.

*Cantharus Cumberlandianus* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 103, pl. xvii, figs. 3-6.

*Description*.—"Fusiform; whorls five, prominent; spire not as long as the mouth; outer lip thick, with about eight teeth on its inner margin, inner lip smooth and thin, a large plate of enamel on the columella and a rudimentary tooth on the upper end near the suture; umbilicus distinct

but imperforate; canal moderate and slightly curved; surface marked by about ten rounded, prominent, longitudinal ribs, crossed by 18 or 20 revolving lines between some of which exist traces of finer lines, the latter visible only on well preserved specimens. There are also visible the usual lines of growth." Gabb, 1860.

Length, 24 mm.; diameter, 14 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CHOPTANK FORMATION. Greensboro.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

### Suborder STREPTODONTA.

### Superfamily PTENOGLOSSA.

#### Family SCALIDÆ.

#### Genus SCALA Humphrey.

#### SCALA SAYANA Dall.

#### Plate LIII, Figs. 1, 2.

*Scalaria clathrus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Scalaria clathrus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Scala sayana* Dall, 1889, Bull. Mus. Comp. Zool., Har., vol. xviii, p. 308.

*Scala sayana* Dall, 1889, Bull. xxxvii, U. S. Nat. Mus., p. 122, pl. 1, fig. 10.

*Scala Sayana* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 158.

*Description*.—"A white shell with nine well-marked varices continuous to the apex, which has a smooth, translucent, pale brown nucleus of about three whorls. . . . The interstices are polished, smooth, with occasional faint microscopic spiral striæ." Dall, 1889.

Shell elongate, ten-whorled; varices 7 to 11, usually 9, somewhat carinated; mouth elliptical. No spiral sculpture is visible on any of the Miocene specimens.

Length, 16 mm.; diameter, 5.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), Turner, Greensboro.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science, Cornell University.

## SCALA MARYLANDICA n. sp.

Plate LIII, Fig. 3.

*Scalaria multistriata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 126, pl. xxiii, fig. 5. Not *Scalaria multistriata* Say.

*Description*.—Shell small, smooth, moderately slender, eight-whorled, regularly conical; whorls round, firmly in contact but with a deep suture; varices 12 to 18 in number on the body whorl, slightly carinated, each made up of 4 lamellæ; mouth round or slightly elliptical: nucleus smooth, elevated, three-whorled.

This species differs from *S. multistriata* Say in being destitute of spiral sculpture; from *S. sayana* in having more varices, in being smaller, and in having a rounder mouth; and from *S. teres* in having fewer varices and in being less elongate.

Length, 10 mm.; diameter, 4 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Greensboro, Dover Bridge, Cordova, Trappe Landing, 2 miles south of Governor Run, Turner. CALVERT FORMATION. Plum Point, Chesapeake Beach, 2 miles south of Chesapeake Beach, Church Hill.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, U. S. National Museum.

Subgenus OPALIA Adams.

## SCALA (OPALIA) CALVERTENSIS n. sp.

Plate LIII, Fig. 4.

*Description*.—Shell solid, elongated, many-whorled; whorls very convex, covered with fine revolving lines; varices about ten on each whorl; very broad and closely set, somewhat carinated, covered with very fine impressed longitudinal lines which appear to break up its surface into laminæ; intervarical spaces very narrow so that the spiral lines are frequently hidden; base with a spiral cord and axial fasciole as on *S. De Bouryi* Dall; mouth round.

Length (of two-whorled fragment), 19 mm.; diameter, 12 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

## SCALA (OPALIA) RETICULATA n. sp.

Plate LIII, Fig. 5.

*Description*.—Shell small, slender, about ten-whorled; whorls convex and very closely set; varices very small but numerous, about 35 on the body whorl, and decreasing in number but increasing in size toward the apex; intervarical spaces with six rounded, raised, revolving lines with finer intermediate ones, both sets being absent above the suture for about twice the ordinary interval of the larger ones; mouth round; base flattened, covered with obsolete revolving lines. Over the greater part of the surface of the shell the varices and revolving ribs are of about equal prominence and at equal distances, thus giving a very noticeable reticulate appearance.

Length, 9 mm.; diameter, 3 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Cornell University, U. S. National Museum.

## SCALA (OPALIA) PRUNICOLA n. sp.

Plate LIII, Fig. 6.

*Description*.—Shell of medium length and acuteness, with about eight whorls; whorls strongly and regularly convex, except at the periphery of the body whorl where there is a sharp angle; revolving ribs obtuse, irregular in distance, six in number; interspaces gently concave, marked with very fine, closely-set, revolving threads; entire surface of the shell covered with very fine, closely-set, longitudinal threads which cross the revolving ribs; varices small, irregular; base with fine radiating, and finer concentric lines.

This species has a superficial resemblance to *S. reticulata*, but differs in lacking distinct and regular varices, in possessing very fine revolving and longitudinal sculpture, and in having more distant and more acute revolving ribs.

A single specimen has been found.

Length (of fragment), 10 mm.; diameter, 5.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

Subgenus *STHENORHYTIS* Conrad.

*SCALA (STHENORHYTIS) EXPANSA* Conrad.

Plate LIII, Fig. 7.

*Scalaria expansa* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 187, 194, pl. ii, fig. 3.

*Scala (Sthenorhytis) expansa* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Scala (Sthenorhytis) expansa* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 18.

*Description.*—"Shell acutely ovate, moderately thick, with numerous robust recurved ribs, twelve in number, counting from the summit of the aperture to the reflected lip, inclusive; whirls profoundly ventricose at the sides, somewhat flattened above; four or five in number." Conrad, 1842.

Obsolete impressed spiral lines are sometimes visible between the varices. The number of whorls is sometimes seven.

Length, 19 mm.; diameter, 16 mm.

*Occurrence.*—ST. MARY'S FORMATION. St. Mary's River. CHOPTANK FORMATION. Jones Wharf.

*Collections.*—Wagner Free Institute of Science, Cornell University.

*SCALA (STHENORHYTIS) PACHYPLEURA* Conrad.

Plate LIII, Fig. 8.

*Scalaria pachypleura* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 30.

*Scalaria pachypleura* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 186.

*Scalaria pachypleura* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 181.

*Scala (Sthenorhytis) pachypleura* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Scala (Sthenorhytis) pachypleura* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 18.

*Scalaria (Sthenorhytis) pachypleura* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 259, pl. xxi, fig. 4.

*Scala pachypleura* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 25.

*Description.*—"Turrited; short in proportion to its width; volutions 6 or 7, rapidly diminishing in size; ribs very thick, prominent, reflected, terminating above in prominent angles. Length five-eighths of an inch." Conrad, 1842.

The mouth is round or very slightly elliptical. A very distinct basal



cingulum extends from the upper end of the mouth around the body whorl to the last varix, being slightly displaced by each of the varices. It is this character which distinguishes the species from *S. expansa*.

Length, 17 mm.; diameter, 12 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

## Superfamily GYMNOGLOSSA.

### Family EULIMIDÆ.

Genus EULIMA Risso.

EULIMA EBOREA Conrad.

Plate LIII, Figs. 9, 10.

*Eulima eborea* Conrad, 1848, Proc. Acad. Nat. Sci. Phila., vol. iii, p. 20, pl. i, fig. 21.  
? *Eulima conoidea* Kurtz and Stimpson, 1851, Proc. Boston Soc. Nat. Hist., vol. iv, p. 115.

*Eulima laevigata* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 269, fig. 157. (Not *Eulima laevigata* H. C. Lea.)

*Eulima eborea* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566. (In part.)

*Eulima eborea* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Eulima eborea* Meyer, 1888, Proc. Acad. Nat. Sci. Phila., vol. xl, p. 170.

? *Eulima conoidea* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 159, pl. v, fig. 11.

*Description*.—"Subulate, whorls 9; suture slightly defined; aperture somewhat oblique, ovate-acute." Conrad, 1848.

Shell slender, varying in outline between the extremes figured, thirteen whorled; right side of the body whorl straight from the suture to the middle of the labrum, then rapidly curving; left side of the body whorl straight not quite to a point opposite the upper end of the mouth, then curving gently and uniformly to the extremity of the shell.

Length, 11 mm.; diameter, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CALVERT FORMATION. Plum Point, Church Hill, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University,

Wagner Free Institute of Science, Philadelphia Academy of Natural Sciences, Cornell University, U. S. National Museum.

EULIMA LÆVIGATA (H. C. Lea).

Plate LIII, Fig. 11.

*Pasithea lævigata* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst. p. 6.

*Pasithea lævigata* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 252, pl. xxxv, fig. 47.

Not *Eulima lævigata* Emmons.

*Eulima eborea* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566. (In part).

*Description*.—"Shell elevated-conical, acuminate, imperforate, thick, smooth, ivory-like, shining; spire attenuate, conical, acute; sutures linear, very small, whorls flat; last whorl somewhat angular; base smooth; aperture obliquely quadrilateral, acutely angular above and below; effuse." Lea, 1845.

Sides straight to the line of continuation of the suture around the middle of the body whorl, here they are obtusely angular then curve to the extremity of the shell.

Length, 10 mm.; diameter,  $2\frac{1}{2}$  mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University, Wagner Free Institute of Science, U. S. National Museum.

EULIMA MIGRANS Conrad.

Plate LIII, Fig. 12.

? *Turbo subulata* Donovan, 1803, The Natural History of British Shells, vol. v, expl. pl. clxxii.

*Eulima migrans* Conrad, 1846, Proc. Acad. Nat. Sci. Phila., vol. iii, p. 20, pl. i, fig. 22.

*Eulima subulata* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 269, fig. 158.

*Eulima migrans* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 266.

*Eulima migrans* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Description*.—"Subulate, very narrow or slender, suture indistinct; aperture direct, oblong-ovate, acute." Conrad, 1846.

"Shell subulate, tapering, pale flesh-color, glossy, fasciated with testaceous-brown. Aperture oval." Donovan, 1803.

This form resembles the original figures of *Eulima subulata* Donovan, and those given by Wood<sup>1</sup> and by Hoernes.<sup>2</sup> Till comparison can be made with authentic specimens of that species it is best to retain the American name.

Length, 7.5 mm.; diameter, 1 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Governor Run (lower bed). CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

Genus NISO Risso.

NISO LINEATA Conrad.

Plate LIII, Fig. 13.

*Bonellia lineata* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 32.

*Bonellia lineata* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 188.

*Bonellia lineata* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 183.

*Bonellia lineata* Conrad, 1848, Proc. Acad. Nat. Sci. Phila., vol. iii, p. 21, pl. i, fig. 23.

*Niso lineata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566. (In part.)

*Niso lineata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

? *Niso lineata* Conrad, 1866, Amer. Jour. Conch., vol. ii, p. 69, pl. iv, fig. 13.

*Niso lineata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 245, pl. xx, fig. 4. (In part.)

*Niso lineata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 25.

*Description*.—"Subulate, polished, with obsolete spiral lines, distinctly visible only on the body whirl; a spiral line margins the suture at base of each volution, causing the suture to appear profound; this line is continued on the middle of the body whirl." Conrad, 1841.

Conrad published two figures supposed to be of this species. The first is good and makes the species absolutely certain even if the description were insufficient. The second figure is bad and led Dall (who overlooked the earlier one) to suggest that H. C. Lea's name, *simplex*,<sup>3</sup> should

<sup>1</sup> A Monograph of the Crag Mollusca, vol. i, p. 97, pl. xix, fig. 3.

<sup>2</sup> Die Fossilien Mollusken des Tertiaer-Beckens von Wien, Band i, p. 547, Taf. xlix, fig. 20.

<sup>3</sup> *Acteon simplex* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 32, pl. xxxvi, fig. 62.

be used instead of *lineata*. If Lea's figure represented this species it would be worse than Conrad's second one. But it is not this species or even a *Niso*, for according to the description there is a fold on the columella. Conrad's second figure probably represents still another species.

Length, 21 mm.; diameter, 8 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

### Family PYRAMIDELLIDÆ.

Genus ODOTOMIA Fleming.

#### ODOTOMIA CONOIDEA (Brocchi).

Plate LIV, Figs. 3, 4.

*Turbo conoideus* Brocchi, 1814, *Conchiologia Fossile Subapennina*, Tome II, p. 660, pl. xvi, fig. 2.

*Odontostomia conoidea* Dall, 1892, *Trans. Wagner Free Inst. Sci.*, vol. iii, pt. ii, p. 250.

*Description*.—"Testa conica, glabra, anfractus planiusculi, infimo subcarinato, aperta ovali, columella uniplicata."

"Questa conchiglia è terrestre o lacustre, ed appartiene al genere *Auricularia* di Lamarck. La sua lunghezza è di circa una linea e mezzo; ha una forma conica acuta, ed è composta di cinque anfratti perfettamente lisci ed appena alquanto convessi. L'inferiore di essi è lungo più di tuttigli altri presi insieme, e forma presso la base un angolo molto ottuso a guisa di carena. L'apertura è ovale, ed il labbro destro si unisce superiormente senza interruzione col sinistro. Nel mezzo della columella vedesi una piega acuta che si perde nella cavità interna." Brocchi, 1814.

The first recorded occurrence of this species in the American Miocene was made by Dall who found the species in the Calvert formation at Shiloh, N. J. The most abundant occurrence of the species in the Maryland Miocene is in the Choptank formation, especially at Jones

Wharf. The specimens from St. Mary's River are elongate and may belong to a distinct variety or species.

Length, 3.5 mm.; diameter, 1.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River. CHOPTANK FORMATION. Jones Wharf, Governor Run.

*Collections*.—Maryland Geological Survey, Wagner Free Institute of Science.

Subgenus CHRYSALLIDA Carpenter.

ODOSTOMIA (CHRYSALLIDA) MELANOIDES (Conrad).

Plate LIV, Fig. 1.

*Acteon melanoides* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., pp. 207, 226, pl. ix, fig. 19.

*Odostomia granulatus* Holmes, 1859, Post-Pleiocene Fossils of South Carolina, p. 86, pl. xiii, figs. 11, 11a, 11b. Not *Acteon granulatus* H. C. Lea.

*Acteon melanoides* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Acteon melanoides* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 13.

*Description*.—"Shell conical, with about six volutions, strongly striated transversely; the striæ are three or four in number on the upper whorls, and the last has about eight; the aperture is ovate, with a fold in the centre." Conrad, 1830.

Shell small, conical, six-whorled; whorls of the spire with four equally distinct, raised, revolving ribs and with numerous (about 30) equally spaced and equally prominent longitudinal ribs which granulate the revolving ribs at their intersection, and finer intermediate longitudinal striæ; base of the body whorl with about eight additional revolving ribs which are not crossed by the more prominent longitudinal ones of the spire, but between which the finer striæ are very distinct; mouth elongate; fold near the upper end of the columella, prominent.

This species is most closely related to *Pyramidella (Chrysallida) granulata* (H. C. Lea), of which a figure is here given (Plate LIV, Fig. 2), and from which it differs only in being much less elongate.

Length, 3.5 mm.; diameter, 1.5 mm.

*Occurrence*.—ST. MARY'S FORMATION(?). St. Mary's River.

*Collection*.—Cornell University.



Subgenus EVALEA A. Adams.

ODOSTOMIA (EVALEA) MARIANA n. sp.

Plate LIV, Fig. 5.

*Description*.—Shell small, elongate-conical, six-whorled; whorls gently convex, marked with faint impressed revolving striae; sutures very distinct; plait small, near the upper end of the columella.

Length, 2.8 mm.; diameter, 1 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Cornell University.

Subgenus SYRNOLA Adams.

ODOSTOMIA (SYRNOLA) MARYLANDICA n. sp.

Plate LIV, Fig. 6.

*Description*.—Shell elongate, pyramidal, twelve-whorled; sutures not deep; whorls nearly flat; surface polished; lines of growth faint; spiral striae irregular and often obsolete; base rounded; plait weak at the mouth, stronger within, situated near the upper end of the columella.

Length, 9 mm.; diameter, 3 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Cornell University.

Subgenus PYRGULINA A. Adams.

ODOSTOMIA (PYRGULINA) CALVERTENSIS n. sp.

Plate LIV, Figs. 7, 8.

*Description*.—Shell small, pyramidal, twice as long as the basal diameter, five-whorled; whorls slightly convex, with many very fine, closely-set revolving lines and about twenty (on the body whorl) longitudinal ribs which are not overridden by the revolving lines; plait prominent, situated very high on the columella.

Length, 2.8 mm.; diameter, 1.3 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—Maryland Geological Survey.

Genus EULIMELLA Forbes.

Subgenus ANISOCYCLA Monterosato.

EULIMELLA (ANISOCYCLA) MARYLANDICA n. sp.

Plate LIV, Figs. 9, 9a.

*Description*.—Shell small, elongate, ten-whorled; whorls slightly convex; sutures distinct; surface highly polished; longitudinal ribs absent; sculpture consisting of about twelve sharp incised revolving grooves at somewhat variable intervals.

This species resembles the English species *Eulimella nitidissima*, which is the type of *Anisocycla*, but is much larger.

Length, 7 mm.; diameter, 2 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science, Cornell University.

Genus TURBONILLA Risso.

Subgenus CHEMNITZIA d'Orbigny.

TURBONILLA (CHEMNITZIA) NIVEA Stimpson.

Plate LIV, Fig. 10.

? *Turritella laqueata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 221, pl. ix, fig. 17.

? *Pasithea exarata* H. C. Lea, 1843, New Fossil Shells from the Tertiary, of Virginia, Abst. p. 6.

? *Pasithea exarata* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 251, pl. xxxv, fig. 44.

*Chemnitzia nivea* Stimpson, 1851, Proc. Boston Soc. Nat. Hist., vol. iv, p. 114.

*Turbonilla nivea* Holmes, 1859, Post-Pleiocene Fossils of South Carolina, p. 83, pl. xiii, figs. 3, 3a, 3b.

*Turbonilla nivea* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 255.

*Description*.—"Shell aciculate, sub-cylindrical, white, shining; whorls eleven, flattened, longitudinally plicate; folds straight, interstices perfectly smooth." Stimpson, 1851.

It is possible, and perhaps even probable that this species was described by Conrad, in 1830, under the name of *Turritella laqueata*. Conrad's type is not in existence and the description and figure are not sufficient to identify the species with absolute certainty. There does not seem to

be any other species at the St. Mary's River for which the description could have been intended. Conrad described the form as follows:

"Shell turreted, smooth, polished, longitudinally ribbed; whorls slightly convex; suture impressed; aperture ovate. One-fifth of an inch in length. It has some resemblance to the *Turbo simillimus* of Montagu, but the ribs are more numerous, and it is also a larger species."

"*Pasithea*" *exarata* H. C. Lea is a *Turbonilla* which differs from this in having elevated rounded ribs which are somewhat curved. It is probably a distinct species or at least a variety. If intermediate forms bridging the gap between *nivea* and *exarata* should be found, Lea's name would of course have priority. The material now at hand does not justify us in uniting the species.

The Maryland forms are exactly like those from the Pliocene and Pleistocene of the Carolinas which Dr. Dall referred to Stimpson's species, but they do not agree very closely with Stimpson's description. For example, instead of having the "raised longitudinal ribs" which Stimpson describes, the Miocene specimens have impressed longitudinal grooves with narrower interspaces. The grooves cease at the periphery of the whorl but the general level of the interspaces is maintained beyond on the base of the whorl.

Length, 6 mm.; diameter,  $1\frac{1}{2}$  mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science.

#### TURBONILLA (CHEMNITZIA) NIVEA Stimpson var.

Plate LIV, Figs. 11, 12.

*Description*.—Shell small, slender, varying in acuteness of spire; whorls, seven to ten gently convex; spiral sculpture absent; body whorl with about thirty irregular, sometimes obsolete longitudinal ribs which die out near the periphery of the body whorl; base rounded, mouth elongate.

Length, 5 mm.; diameter, 1 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science.

Subgenus PYRGISCUS Philippi.

TURBONILLA (PYRGISCUS) INTERRUPTA (Totten).

Plate LIV, Figs. 13, 14.

*Turritella interrupta* Totten, 1835, Amer. Jour. Sci., vol. xxviii, p. 352, pl. i, fig. 7.

*Turbonilla interrupta* Holmes, 1859, Post-Pleiocene Fossils of South Carolina, p. 83, pl. xiii, figs. 4, 4a, 4b.

*Turbonilla interrupta* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 259.

*Description*.—"Shell, small, subulate, brownish: *volutions* about ten, almost flat, with about twenty-two transverse, obtuse ribs, separated by grooves of equal diameter, and with about fourteen sub-equal, impressed, revolving lines, which are arranged in pairs, and entirely interrupted by the ribs: below the middle of the body whorl, the ribs become obsolete, and the revolving lines continuous: *sutures*, made quite distinct by a slight shoulder to each volution: *apertures*, ovate, angular above, regularly rounded below, about one-fifth the length of the shell: right lip, sharp, indistinctly sinuous." Totten, 1835.

The form described by H. C. Lea as *Pasithea subula* has some resemblance to this species but differs from it in having the spiral lines finer, and the body whorl less angular with the longitudinal ribs extending to near the base and dying out gradually instead of ending abruptly on the angle.

Length, 11 mm.; diameter,  $2\frac{1}{2}$  mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf, Greensboro. CALVERT FORMATION. Plum Point, Reeds, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science.

Subgenus TRAGULA Monterosato.

TURBONILLA (TRAGULA) GUBERNATORIA n. sp.

Plate LIV, Fig. 15.

*Description*.—Shell small, short, conical, thick, six-whorled; whorls gently convex, with sixteen gently curved longitudinal ribs; lower half

of the whorl with several impressed revolving lines which do not cross the longitudinal ribs; plait small, oblique, situated near the middle of the columella.

Length (of fragment), 2 mm.; diameter, 0.8 mm.

*Occurrence*.—CHOPTANK FORMATION. Governor Run (lower bed).

*Collection*.—Maryland Geological Survey.

## Superfamily TÆNIOGLOSSA.

### Family TRITONIDÆ.

Genus TRITONIUM Link.

#### TRITONIUM CENTROSUM (Conrad).

Plate LV, Figs. 1, 2.

*Bursa centrosa* Con. *sp. nov.* Cope, 1867, Proc. Acad. Nat. Sci. Phila., vol. xix, p. 139. (Name only.)

*Bursa centrosa* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 264, pl. xxi, fig. 10.

*Description*.—"Turritid; spire elevated; whorls with granulated revolving unequal lines, and a series of rounded, prominent, closely arranged nodes on the angle which is situated below the middle of the whorls; body whorl with three distant nodular revolving ribs; the lower one small; columella with transverse irregular plaits." Conrad, 1868.

The first four or five whorls are polished, and shaped like a *Natica*. Then the sculpture abruptly begins. This sculpture consists of many granulated revolving lines, which override one to three revolving rows of nodes on and below the shoulder of the whorl, and which are in turn overridden by a series of microscopic, closely set, revolving lines and lines of growth.

Length, 28 mm.; diameter, 15 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Charles county, near the Patuxent river (*vide* Cope).

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.



## Family DOLIIDÆ.

Genus PYRULA Lamarck.

PYRULA HARRISI n. sp.

Plate LV, Fig. 3.

*Pyrula n. sp.* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 25.

*Description*.—Shell globose, thin, five-whorled; spire low, whorls slightly convex, suture not deep; body whorl large, inflated; surface covered with raised revolving ribs with broader interspaces and with sometimes one or more narrow intermediate ribs; revolving ribs exceeding 65 on the body whorl, absent on a narrow band below the suture; lines of growth fine, closely set, occasionally rugose; mouth large, widest near the center, somewhat callous at the upper end; canal broad, short.

Fragments of this species are very abundant but it is seldom that good specimens can be found.

Length, 33 mm.; diameter, 25 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

## Family CASSIDÆ.

Genus CASSIS Lamarck.

CASSIS CÆLATA Conrad. \*

Plate LV, Fig. 4.

*Cassis cælata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.  
(Name only.)

*Cassis cælata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 218,  
pl. ix, fig. 14.

*Cassis cælata* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Semicassis cælata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 564.

*Semicassis cælata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.

*Description*.—"Shell with transverse tuberculated ribs, and intervening striæ; whorls of the spire longitudinally ribbed; right lip toothed within; columella granulate and wrinkled.

"The transverse striæ of the grooves between the ribs are very distinct, and between each of the tubercles a longitudinal raised line crosses the

grooves, giving the shell somewhat of a cancellated appearance." Conrad, 1830.

Length, 38 mm.; diameter, 28 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences.

## Family CYPRÆIDÆ.

Genus ERATO Risso.

### ERATO PEREXIGUA (Conrad).

Plate LV, Fig. 5.

*Marginella perexigua* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 32.

*Marginella perexigua* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 189.

? *Erato laevis*<sup>1</sup>? Emmons, 1858, Rept. N. Car. Geol. Survey, p. 262, fig. 139.

? *Erato Mangeriae* Emmons, 1858, Rept. N. Car. Geol. Survey, "Additions and Corrections."

*Volutella* sp. Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 226.

*Volutella* sp. nov. Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 24.

*Erato Emmonsii* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 108, pl. xix, figs. 9-11.

*Description*.—"Very small, obtusely ovate; labrum profoundly thickened, the margin minutely crenulated; labium with 4 plaits; spire depressed; volutions concealed.

"A small species very much like a *Cypræa* in form. Length one-eighth inch." Conrad, 1842.

Whitfield describes the form from the New Jersey Miocene as follows:

"Shell small, strongly obovate, swollen or inflated above, and contracted in the lower part; spire short or very obtuse, slightly coated so as to render the suture indistinct; aperture narrow, not quite as long as the body of the shell. Outer lip thickened outwardly and in the medial portion of its length on the inside and below, but scarcely so above; strongly crenulated over all the thickened parts, bearing ten distinct ridges on the only perfect example seen. Inner lip bearing four distinct

<sup>1</sup> Emmons' species has been generally known by this name. Everyone seems to have overlooked the fact that Emmons himself in the "Additions and Corrections" at the end of the volume changed the determination to *Erato Mangeriae*.

ridges or teeth, the lower one of which is the most distinct. The surface of the shell has been polished when perfect."

There is little doubt that it is the same as the Maryland form. The identity of Emmons' species is a different question.

Length, 9 mm.; diameter, 6 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Cornell University.

### Family CERITHIOPSIDÆ.

Genus SEILA A. Adams.

SEILA ADAMSII (H. C. Lea).

Plate LV, Fig. 6.

*Cerithium Emersonii* var. C. B. Adams, 1839, Boston Jour. Nat. Hist., vol. ii, p. 285.

*Cerithium terebrale* C. B. Adams, 1840, Boston Jour. Nat. Hist., vol. iii, p. 320, pl. iii, fig. 7.

? *Cerithium clavulus* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia (Abst.), p. 11.

*Cerithium Adamsii* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 268.

*Cerithium annulatum* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 269, fig. 161.

*Cerithiopsis annulatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566.

*Cerithiopsis annulatum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183). p. 17.

*Seila Adamsii* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 267.

*Description*.—"Granules obsolete, with simple, broad, elevated, revolving lines, the middle one on several of the lower whorls as prominent as the outer ones." Adams, 1839.

"*Shell* small, elongated, brown, frequently with a white band, with rather slight incremental striæ; *whorls* eleven or twelve, flattened; *spire* seven-eighths of the length of the shell, five-sixths of its bulk, its opposite sides containing an angle of about 20°, conic, with four elevated, obtuse, revolving lines on each whorl, of which the first and second, and third and fourth are equidistant; the space between the second and third is obviously less on the upper whorls, but approaches to an equality with the other spaces, in the growth of the shell; the first three ridges are equal, and the fourth small and depressed, so as to lie almost wholly beneath the first of the succeeding whorl; the *suture* consequently appears on the

upper side of the first ridge, and is moderately impressed; spaces between the ridges crossed by more or less elevated irregular lines, or coarse striae of growth; *last whorl* on the upper half, sculptured as the spiral whorls with a fifth smaller revolving line on the lower part; *aperture* ovate, one-eighth of the length of the shell, the line of its length making an angle of about  $25^{\circ}$  with the axis of the shell; *labrum* thin; *canal* rather more than a third as long as the aperture, turning to the left." Adams, 1840.

The question as to the name of this has been discussed in detail by Dr. Dall, but the question is further complicated by the possible equivalency of *Cerithium clavulus* H. C. Lea. If the Virginia Miocene species, *clavulus*, is the same as the recent species, *terebrale* Adams *non* Lamarck, then *clavulus* will have priority, as it dates from 1843, while the footnote in which Lea proposed *adamsii* as a substitute for *terebrale* Adams was omitted from the 1843 edition of Lea's paper and did not appear until two years later.

Length, 8 mm.; diameter, 2.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Dover Bridge, Greensboro, Cordova, Jones Wharf. CALVERT FORMATION. Plum Point, Church Hill, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

Genus CERITHIOPSIS Forbes and Hanley.

CERITHIOPSIS CALVERTENSIS n. sp.

Plate LV, Fig. 7.

*Description*.—Shell small, elongate, pyramidal, fragile, many-whorled; suture distinct, deep; four broad revolving ridges with broader interspaces crossed by about thirty raised longitudinal ribs which granulate the spirals at their intersection; the lower revolving ridge hidden by the succeeding whorl of the spire; base smooth, except for lines of growth.

This species may be readily distinguished from the following by having four revolving ridges almost equal in size instead of only two prominent ones, and by having the ridges less strongly nodular.

Length, 8 mm.; diameter, 2.5 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

CERITHIOPSIS SUBULATA (Montagu).

Plate LV, Fig. 8.

*Murex subulatus* Montagu, 1808, Test. Brit. Suppl., p. 115, pl. xxx, fig. 6.

*Cerithiopsis* (*Eumeta* ?) *subulata* Dall, 1889, Bull. Mus. Comp. Zool. Har., vol. xviii, p. 252, pl. xx, fig. 4.

*Cerithiopsis* (*Eumeta*) *subulata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 268.

*Description*.—Shell small, pyramidal, twelve-whorled; whorls with two large and two small revolving ribs alternating in position, spire wound on the lower and smaller rib half concealing it; larger ribs with twenty-two large regular nodes; smaller rib between the two larger ones obsolete except on the later whorls; base smooth; canal short, sharply bent.

This species occurs very abundantly at Greensboro. The specimens have a very close resemblance to those from the Caloosahatchie river.

Length, 8 mm.; diameter, 2.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

Family PLEUROCERATIDÆ.

Genus GONIOBASIS Lea.

GONIOBASIS MARYLANDICA n. sp.

Plate LV, Fig. 9.

*Description*.—Shell thin, five-whorled; spire pyramidal, wound slightly below the shoulder of the whorl; sutures distinct but not deep; surface marked by low, narrow revolving ribs with much wider interspaces; revolving ribs about twelve on the body whorl and five on each whorl of the spire; lines of growth irregular; mouth large, widest below; columella concave; labium callous and marked by faint longitudinal striations. A single specimen of this interesting form has been obtained.

Length, 15 mm.; diameter, 6.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collection*.—Maryland Geological Survey.



## Family CÆCIDÆ.

Genus CÆCUM Fleming.

CÆCUM CALVERTENSE n. sp.

Plate LV, Fig. 10.

*Description.*—This species is marked by very fine, closely-set, irregular annulations, and no other sculpture.

Length of segment, 4 mm.; diameter (maximum), 0.8 mm.

*Occurrence.*—CALVERT FORMATION. Church Hill, 3 miles west of Centerville.

*Collection.*—Maryland Geological Survey.

CÆCUM PATUXENTIUM n. sp.

Plate LV, Figs. 11, 12.

*Description.*—The only sculpture consists of from 30 to 40 strong, regular, closely-set annulations.

This species bears a strong superficial resemblance to *C. floridanum* Stimpson, but differs from it in possessing no longitudinal markings.

Length of segment, 2.2 mm.; diameter, 0.5 mm.

*Occurrence.*—CHOPTANK FORMATION. Greensboro, Dover Bridge, Cordova, Peach Blossom Creek, Jones Wharf, Governor Run (lower bed).

*Collection.*—Maryland Geological Survey.

CÆCUM GREENSBOROËNSE n. sp.

Plate LV, Fig. 13.

*Description.*—Shell apparently smooth and highly polished, but under high magnification showing irregular, almost obsolete annulations which are strongest at the ends of the segments.

Length of segment, 3 mm.; diameter, 0.5 mm.

*Occurrence.*—CHOPTANK FORMATION. Greensboro.

*Collection.*—Maryland Geological Survey.

## Family VERMETIDÆ.

Genus VERMETUS Adanson.

## VERMETUS GRANIFERUS (Say).

Plate LV, Figs. 14, 15.

*Serpula granifera* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 154, pl. viii, fig. 4. (Reprint, 1896, Bull. Amer. Pal., No. 5.)

*Serpulorbis granifera* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 303.

*Anguinella virginiana* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 132, pl. xxiv, figs. 1-5.

*Description*.—"Covered with longitudinal, contiguous, slightly elevated, granulated striæ.

"Shell subcylindric, contorted, inferior side flat; the whole surface is composed of very numerous, small, contiguous striæ, each consisting of a single row of granules; these series are alternately smaller.

"Diameter of the larger end three-tenths of the largest specimen two-fifths of an inch. The continuity of the tube within is interrupted by oblique diaphragms. It sometimes approaches the spiral form, and one specimen has three complete volutions of much regularity." Say, 1824.

Length of tube (longest observed fragment), 160 mm.; diameter of same tube, 8 mm.; maximum diameter, 15 mm.

*Occurrence*.—ST. MARY'S FORMATION.—St. Mary's River. CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), Greensboro. CALVERT FORMATION. Plum Point, Chesapeake Beach, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## VERMETUS VIRGINICUS (Conrad).

Plate LV, Fig. 16.

*Serpula virginica* Conrad, 1839, Fossils of the Medial Tertiary, cover of No. 1, p. 3, Reprint, 1893, p. [51].

*Anguinella virginiana* Conrad, 1845, Fossils of the Medial Tertiary, p. 77, pl. xlii, fig. 4.

*Anguinella virginiana* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Anguinella virginiana* MEEK, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Vermetus* ? (*Anguinella*) *virginica* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 306.

Not *Anguinella Virginiana* Whitfield.

*Description*.—"Shell terete, slender, adhering in large groups, occasionally angulated, with sessile spiral convolutions; surface with acute prominent transverse wrinkles." Conrad, 1839.

"Terete, slender, adhering, with strong annular wrinkles; toward the apex are contiguous volutions, somewhat angular or subcarinated; the whorls with obsolete revolving lines and subcarinated near the base; internally furnished with vaulted septa." Conrad, 1845.

This species differs from *V. graniferus* in being less intricately coiled and in being destitute of all sculpture except annular wrinkles and lines of growth.

Diameter of tubes, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point. CHOPTANK FORMATION. Jones Wharf, Greensboro, Cordova; CALVERT FORMATION. Plum Point, Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

### Family TURRITELLIDÆ.

Genus TURRITELLA Lamarck.

#### TURRITELLA INDENTA Conrad.

Plate LVI, Figs. 1, 2.

*Turritella indenta* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 32.

*Turritella indenta* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 188.

*Turritella indenta* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 182, 183.

*Turritella indenta* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Turritella indenta* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Turritella indenta* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 258, pl. xxi, fig. 3.

*Turritella indenta* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 308.

*Turritella indenta* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 24, 25.

*Description*.—"Subulate, whorls about 15, contracted or indented above the middle, and with obsolete spiral striæ; suture profound, the lower margin obtusely carinated by the indentation; the upper margin also subcarinated; basal margin acutely angulated; base flat or slightly concave." Conrad, 1842.

"Broad at base; whorls each with two revolving obtuse lines, the inferior one largest, subtuberculated and margins the suture, and an im-

pressed line marks its upper margin; the other revolves on the upper margin of the whorls; suture profoundly excavated, sides of volution slightly concave; revolving lines rugose, minute." Conrad, 1868.

Length, 62 mm.; diameter, 19 mm.

*Occurrence*.—CHOPTANK FORMATION. 2 miles south of Governor Run, Greensboro (?). CALVERT FORMATION. Truman's Wharf, Lyon's Creek, Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach, Reed's, Skipton, "Huntingtown" (*vide* Conrad).

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

#### TURRITELLA ÆQUISTRIATA Conrad.

Plate LVI, Fig. 3.

*Turritella æquistriata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, pp. 567, 584.

*Turritella æquistriata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Turritella æquistriata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 128, pl. xxiii, figs. 12-14.

*Description*.—"Subulate, volutions 14, bicarinate, carinæ distant with a concave interval, the lower carina near the suture; surface covered with nearly equal fine closely-arranged striæ, with a minute intermediate line; aperture longer than wide." Conrad, 1862.

Length, 44 mm.; width, 12 mm.

*Occurrence*.—CALVERT FORMATION. Church Hill, Evans Farm near Church Hill, 3 miles west of Centerville, Plum Point, between McKendree and Pindell, Wye Mills.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

#### TURRITELLA PLEBEIA Say.

Plate LVI, Figs. 4, 5, 6, 7, 8, 9.

*Turritella plebeia* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 125, pl. vii, fig. 1. (Reprint, Bull. Amer. Pal., 1896, No. 5.)

*Turritella plebeia* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Turritella octonaria* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 144.

- Turritella plebeia* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 182, 187.  
*Turritella plebeia* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.  
*Turritella octonaria* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.  
*Turritella plebeia* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.  
*Turritella octonaria* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.  
*Turritella plebeia* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 25, 26, 27, 28.  
*Turritella (Mesalia ?) plebeia* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 130, pl. xxiii, figs. 6-8.

*Description*.—"Whorls convex, hardly flattened in the middle, with about twelve revolving elevated striæ, the middle ones alternately somewhat smaller; transverse wrinkles distinct." Say, 1824.

The forms which have been referred to *plebeia* are considerably varied in character and Say's description will not apply to them all. The name is here used in a broad sense to cover all those *Turritellas* from these beds whose whorls are more or less convex; are covered with fine, uniform or uniformly alternating, raised, revolving striæ; and are not carinated. The typical form with very convex whorls, not flattened, occurs throughout the Miocene, but is the only form in the St. Mary's formation. A form (*var. A*) with almost flat whorls and an indistinct suture occurs in the Choptank and Calvert formations. The striæ are very uniform and closely set. At Plum Point the most abundant form (*var. B*) has deep sutures and flat-topped whorls. It is smaller than the typical form.

The variety which Conrad described as *Turritella octonaria* is characterized by having about eight prominent irregular revolving ribs with intermediate ones. It occurs only in the Choptank formation at Dover Bridge.

Length, 47 mm.; diameter, 13 mm. (*Typical form*).

Length, 22 mm.; diameter, 7 mm. (*var. A*).

Length, 35 mm.; diameter, 10 mm. (*var. B*).

Length, — mm.; diameter, 13 mm. (*var. octonaria*).

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Greensboro, Cordova, Peach Blossom Creek, Dover Bridge, Flag Pond, Governor Run (upper and lower beds), 2 miles south of Governor Run, Jones Wharf, Pawpaw Point, CALVERT FORMATION. Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach, Truman's Wharf.



*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

TURRITELLA VARIABILIS Conrad.

Plate LVII, Fig. 1.

*Turritella variabilis* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 221, pl. x, fig. 3.

*Turritella variabilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Turritella variabilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Turritella variabilis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Description*.—"Shell subulate, turreted, tapering to an acute apex; whorls flattened in the middle, with from two to five smooth ribs on each, and transversely striated; suture impressed.

"The ribs are generally three in number, but a variety occurs with two only, or the intermediate one becomes obsolete. The largest specimens, which much exceed the figure in size, sometimes have five ribs on each whorl." Conrad, 1830.

This species is extremely variable and has been described under many names. The varieties described below with the synonyms quoted under each include all the names which have been applied to Maryland specimens. These varieties can be clearly recognized in the adult specimens, but the young cannot be separated.

The name *T. variabilis* has been applied only to specimens from St. Mary's River and the typical form of the species is here regarded as restricted to that horizon. It is distinguished by its moderately but uniformly convex whorls with many revolving ribs, from two to five of which are larger than the rest, uniformly distributed over the whorl, and of equal prominence.

Length (restored), 80 mm.; diameter, 12 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## TURRITELLA VARIABILIS VAR. ALTICOSTATA Conrad.

## Plate LVII, Fig. 2.

*Turritella alticostata* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 144.

*Turritella alticostata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Turritella terebriformis* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 30.

*Turritella terebriformis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 311 (in part).

*Description*.—"Shell much elongated, subulate, whorls twelve to fourteen, each profoundly carinated near the base, and with prominent spiral striae." Conrad, 1834.

This variety includes those forms from the Choptank formation which are characterized by the presence of very large revolving ribs on the lower half of the whorl. This condition was well developed only on the later whorls of large individuals.<sup>1</sup>

Length, unknown; diameter, 21 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro, Dover Bridge, Peach Blossom Creek, Cordova, Flag Pond, Governor Run, 2 miles south of Governor Run, Pawpaw Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## TURRITELLA VARIABILIS VAR. CUMBERLANDIA Conrad.

## Plate LVII, Figs. 3, 4.

*Turritella variabilis* var. Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 221.

*Turritella Cumberlandia* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xlv, pp. 567, 584.

*Turritella cumberlandia* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Turritella cumberlandia* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 129, pl. xxiii, figs. 9-11.

*Description*.—"Elongated, tapering gradually; volutions 24, bicarinated, carinae nearly equal, distant; revolving lines unequal, wrinkled; sides of whorls concave between the carinae, somewhat channeled beneath the lower one, and rounded at the base. Length  $2\frac{3}{8}$ ." Conrad, 1862.

<sup>1</sup> Dr. Dall referred to his *T. terebriformis* specimens from the Chipola beds, from the Miocene of Virginia (collected by Conrad) and Harris' specimen from Greensboro (not Yorktown, Va.). The last is identical with *alticostata*. The species *terebriformis* may still be valid if the Maryland specimens are eliminated.

This variety includes all those forms from the Choptank and Calvert formations which are characterized by the presence of two revolving ribs, approximately equal in size and equally distant from the upper and lower sutures of the whorls, with a somewhat smooth concave band between them.

This variety represents an archaic condition retained longest in the individuals from the Calvert formation, but almost always present on the early whorls of individuals from the Choptank formation, and occasionally seen on those from the St. Mary's formation.

Length, 70 mm.; diameter, 12 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro, Dover Bridge, Peach Blossom Creek, Flag Pond, Governor Run, 2 miles south of Governor Run, Trappe Landing, Jones Wharf, Turner, Pawpaw Point. CALVERT FORMATION. Church Hill, Reed's, Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach, Truman's Wharf.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

#### TURRITELLA VARIABILIS VAR. EXALTATA Conrad.

Plate LVII, Fig. 5.

*Turritella exaltata* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 32.

*Turritella exaltata* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 188.

*Turritella exaltata* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 182.

*Turritella exaltata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 567.

*Turritella exaltata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16

*Turritella exaltata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 24, 25.

*Description*.—"Subulate, profoundly elongated; whorls convex, with spiral striæ; base of each with a slight groove, and carinated line which margins the suture; waved longitudinal rugæ robust." Conrad, 1842.

This variety includes all those forms in the Calvert formation which have convex whorls with a revolving rib near the base. It differs from *var. alticostata* in having a single revolving rib which is placed nearer the suture than is the more prominent rib of that variety.

Length, 140 mm.; diameter, 14 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## TURRITELLA VARIABILIS VAR.

Plate LVII, Figs. 6, 7, 8.

In addition to the varieties already described, there are in the Calvert formation several other forms which perhaps would be as worthy of retaining names as those already discussed. But the variation in this species is so extreme that it seems unwise to give additional names without stronger reasons than at present exist.

*Var. A.*—Much elongate, whorls with an elevated carination near the lower suture, surface concave on either side of the carination. There is a peculiar form from Skipton in the U. S. National Museum which resembles this, and which is labelled "*T. terstriata* Rogers."

*Var. B.*—Much elongated, whorls strongly convex, sculpture almost obsolete.

*Var. C.*—Whorls flat, sculpture obsolete.

*Occurrence.*—CALVERT FORMATION. Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach, Truman's Wharf, White's Landing, Fairhaven.

*Collections.*—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## Genus TACHYRHYNCHUS Mörch.

## TACHYRHYNCHUS PERLAQUEATUS (Conrad).

Plate LVII, Fig. 9.

*Turritella perlaqueata* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 32.

*Turritella perlaqueata* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 189.

*Turbonilla perlaqueata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566.

*Turritella perlaqueata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Description.*—"Subulate; whirls convex at base, longitudinally ribbed or fluted, with very fine spiral striæ, most profound towards the base of the larger volution. Length rather more than half an inch." Conrad, 1841.

Length, 13.5 mm.; diameter, 4.5 mm.

*Occurrence.*—CALVERT FORMATION. Plum Point.

*Collections.*—Philadelphia Academy of Natural Sciences, U. S. National Museum.

## Family LITTORINIDÆ.

Genus LITTORINA Férussac.

## LITTORINA IRRORATA (Say).

Plate LVIII, Fig. 1.

*Turbo irroratus* Say, 1822, Jour. Acad. Nat. Sci. Phila., vol. ii, 1st ser., p. 239.*Littorina irrorata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 320.

*Description*.—"Shell thick, greenish or pale cinereous, with numerous revolving, elevated, obtuse, equal lines, which are spotted with abbreviated brownish lines; *suture* not indented; *spire* acute; *labium* incrassated, yellowish-brown; *labrum* within white and thick, at the edge thin, and lineated with dark brownish; *throat* white; *columella* with an indentation; *operculum* coriaceous." Say, 1822.

A single somewhat worn specimen of this species has been found. This is the first record of it in the Miocene.

Length (restored), 14 mm.; diameter, 11 mm.

*Occurrence*.—CHOPTANK FORMATION. Choptank River.

*Collection*.—U. S. National Museum.

## Family FOSSARIDÆ.

Genus FOSSARUS Philippi.

Subgenus ISAPIS H. and A. Adams.

## FOSSARUS (ISAPIS) DALLI (Whitfield).

Plate LVIII, Fig. 2.

*Carinorbis* (*Delphinula*) *globulus* Heilprin, 1887, Proc. Acad. Nat. Sci. Phila., vol. xxxix, p. 404.

Not *Delphinula globulus* H. C. Lea.

*Trichotropis dalli* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 127, pl. xxiii, figs. 1-4.

*Description*.—"Shell rather small, obliquely ovate, ventricose; body volution forming nearly the entire bulk, very ventricose on the side and below, and somewhat flattened on the shoulder. Volutions about four in number, the apex slightly mammillated; aperture round-oval, nearly as wide as long, the peristome entire, in contact with the preceding volution on the upper inner side, but not coalescent; umbilicus small but distinctly



open. Surface marked by six strong, elevated, spiral ridges, with flattened interspaces, the upper ridge being a little the strongest. These spiral ridges often appear double on the surface, from the effect of weathering, but when perfect they are rounded. There are also finer but distinct transverse raised lines, which cross the spiral ridges, and are distinct on the interspaces, but faint or even obsolete on the spiral ridges. Inner margin of the lip faintly marked by depressions corresponding to the spiral lines." Whitfield, 1894.

Length, 16 mm.; width, 11 mm.

*Occurrence*.—CALVERT FORMATION. Church Hill, Plum Point, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

### Family SOLARIIDÆ.

Genus SOLARIUM Lamarck.

#### SOLARIUM TRILINEATUM Conrad.

Plate LVIII, Figs. 3a, 3b, 3c.

*Solarium trilineatum* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 31.

*Solarium trilineatum* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 186.

*Solarium trilineatum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 181.

*Architectonica (Phillipia) trilineata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 566.

*Architectonica (Phillipia) trilineata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 17.

*Architectonica trilineata* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 260, pl. xx, fig. 5.

*Solarium trilineatum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 327.

*Solarium trilineatum* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 25.

*Description*.—"Depressed, conical; whirls with obsolete spiral lines, and fine transverse striæ, an impressed line below the suture; whirls carinated at base; suture deeply impressed; periphery carinated, and margined above and beneath by a carinated line; umbilicus profound, crenate on the margin, and with a submarginal impressed line, striæ radiating from the umbilicus, becoming obsolete towards the periphery. Width  $\frac{1}{2}$  inch." Conrad, 1841.

Height, 9 mm.; diameter, 14 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

#### SOLARIUM AMPHITERMUM Dall.

Plate LVIII, Figs. 4a, 4b.

*Solarium amphitermum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 330, pl. xxii, figs. 16, 16a.

*Description*.—"Shell moderately elevated, large, solid, with a blunt periphery and about seven whorls; nucleus sinistral, overturned and immersed in the succeeding coil; upper surface with a transverse sculpture of regularly spaced, impressed lines in harmony with the flexuous lines of growth; periphery marked by a strong, broad, blunt rib cut by the impressed lines so as to carry squarish nodulations. This is separated from a similar but less pronounced rib behind by a deep, very narrow groove; the surface hence to the suture may have one or two fine obsolete spiral raised lines, or may show merely the transverse impressed lines which sometimes gather at the appressed suture; base flattened, inside the rounded edge of the peripheral rib is a small beaded spiral; umbilicus small, bordered by a stout rib with about twelve denticles, outside of which is a smaller, undulated, flattish rib with a deep, narrow groove on each side; between this and the peripheral cord the surface is nearly smooth, or with a few fine obsolete raised lines transversely sculptured with impressed radiating lines strongest near the umbilicus; aperture subquadrate, wider than high, the end of the umbilical rib, when perfect, grooved and guttered. Max. diam. of shell 18.5; of umbilicus 5.0; alt. of shell, 10.0 mm. . . . .

"*S. trilineatum* . . . . . is . . . . . smaller, proportionately more elevated and has a sharp periphery." Dall, 1892.

Height, 10 mm.; diameter, 18.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

## Family RISSOIDÆ.

Genus RISSOA Fréminville.

Subgenus ONOBA Adams.

RISSOA (ONOBA) MARYLANDICA n. sp.

Plate LVIII, Fig. 5.

*Description*.—Shell small, fragile, elongate, five-whorled; whorls convex; surface polished, with faint lines of growth and numerous fine revolving striæ which are most distinct at the base of the whorl; mouth wide; umbilicus distinct.

The specimens from the Calvert formation differ from the type which is from Cove Point in having a more solid shell, finer revolving striæ, and a smaller umbilicus.

Length, 4.5 mm.; diameter, 2.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point. CALVERT FORMATION. Plum Point, Church Hill, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Cornell University.

## RISSOA SP.

A single fragment evidently represents a new species but is too imperfect to figure or to receive a name. The shell is elongate with very convex whorls which are sculptured by distinct revolving ridges with broader interspaces in which the lines of growth are very distinct.

Length (of fragment),  $2\frac{1}{2}$  mm.; diameter, 1 mm.

*Occurrence*.—CALVERT FORMATION. 3 miles west of Centerville.

*Collection*.—Maryland Geological Survey.

## Family ADEORBIDÆ.

Genus ADEORBIS S. Wood.

ADEORBIS SUPRANITIDUS S. Wood.

Plate LVIII, Figs. 6a, 6b, 6c.

*Adeorbis supra-nitidus* S. Wood, 1842, Catalogue of Crag shells, Ann. and Mag. Nat. Hist., vol. ix, p. 530.

*Adeorbis supra-nitidus* S. Wood, 1848, Mollusca of the Crag, pt. i, p. 137, pl. xv, figs. 5a, 5b.

*Adeorbis supranitidus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 344.

*Description*.—"Shell depressed, small, smooth, glossy, and naked above, with from one to three sharp carinæ, the upper one small, often wanting; volutions 3-4, with a depression or subcanal near the suture; umbilicus large, open, coarsely striated within; peritreme sharp, slightly interrupted by the body whorl.

"*Diameter*,  $\frac{1}{8}$  of an inch; *altitude*,  $\frac{1}{2}$  the diameter." Wood, 1848.

This form, which is very rare at the single Maryland locality where it has been found, has a wide distribution in the Miocene and Pliocene of the Atlantic coast of the United States, the Pliocene of Europe, and is living on both shores of the Atlantic.

Height, 1 mm.; diameter, 2 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Wagner Free Institute of Science, Cornell University, U. S. National Museum.

### Family CALYPTRÆIDÆ.

Genus CRUCIBULUM Schumacher.

#### CRUCIBULUM COSTATUM (Say).

Plate LVIII, Figs. 7a, 7b.

*Calyptræa costata* Say, 1820, Amer. Jour. Sci., vol. ii, p. 40. (Reprint, 1896, Bull. Amer. Pal., No. 5.)

*Dispotæa costata* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 132. (In part.)

Not *Dispotæa costata* Conrad and others.

*Dispotæa grandis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 185. Not of Say.

*Description*.—"Oval, convex, with numerous slightly elevated, equal equidistant costæ, and crowded obtuse, concentric lines, which are regularly undulated by the costæ; *apex* mamillated inclining to one side; *inner valve* patelliform, dilated, attached by one side to the side of the shell, acutely angulated at the anterior junction, and rounded at the posterior junction, and rapidly tapering to an acute tip, which corresponds with the inner apex of the shell." Say, 1820.

The original locality of this species as given by Say is Upper Marlboro and the fossils which he mentioned as associated with it are all Calvert forms. Undoubtedly the material came from one of the numerous Miocene outliers in the vicinity of Upper Marlboro. Both the original lo-

cality and the original description clearly show that this is a Calvert and Choptank form and very distinct from the St. Mary's form, which all later authors and probably Say himself regarded as identical with it.

Height, 21 mm.; length, 43 mm.; width, 33 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run, 2 miles south of Governor Run, Flag Pond, Peach Blossom Creek, Cordova, Sand Hill, St. Leonard Creek. CALVERT FORMATION. Plum Point, Chesapeake Beach, Church Hill, 3 miles west of Centerville, Wye Mills.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

CRUCIBULUM COSTATUM VAR. PILEOLUM (H. C. Lea).

Plate LVIII, Figs. 8a, 8b, 9a, 9b, 10.

*Dispotæa costata* Conrad, 1842, Proc. Nat. Inst., Bull ii, p. 187.

*Calyptræa pileolus* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst. p. 6.

*Calyptræa Pileolus* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 248, pl. xxxv, fig. 38.

*Dispotæa costata* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 79, pl. xlv, fig. 2.

*Crucibulum costatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Crucibulum costatum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crucibulum auricula* var. *costatum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 349.

*Description*.—"Shell irregularly conical, thick, sulcate; sulci radiating, large, irregular; concentric striæ minute, small; apex smooth, twisted into two whorls; aperture sub-rotund; cyathus large, wide, angular." H. C. Lea, 1845.

"Somewhat conical, with profound irregular ribs, and very coarse concentric wrinkles; apex not central, prominent, obliquely inclined, margin profoundly scalloped; diaphragm ovate, profound, the margins free." Conrad, 1845.

This variety includes all the strongly costate forms with a cup free at the periphery in the adult.

Height, 25 mm.; length, 50 mm.; width, 42 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.



*Collections.*—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

CRUCIBULUM CONSTRICTUM Conrad.

Plate LVIII, Fig. 11.

*Dispotæa constricta* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 194, pl. i, fig. 2.

*Dispotæa constricta* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 80, pl. xlv, fig. 4.

*Crucibulum constrictum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Crucibulum constrictum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crucibulum constrictum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 350.

*Description.*—"Shell irregular, elevated; laterally compressed, marked with simple lines of growth; apex prominent, with one or two minute volutions; diaphragm very profound." Conrad, 1842.

"Very irregular, elevated, laterally compressed; transversely rugose; apex submedial, very prominent, obliquely inclined, and with 1 or 2 minute volutions; diaphragm extremely profound, adhering by nearly half the circumference of the margin." Conrad, 1845.

Height, 10 mm.; length, 12 mm.; width, 8 mm.

*Occurrence.*—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff.

*Collections.*—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

CRUCIBULUM MULTILINEATUM Conrad.

Plate LVIII, Figs. 12a, 12b.

*Dispotæa multilineata* Conrad, 1842, Amer. Jour. Sci., vol. xli, p. 346, pl. ii, fig. 7.

*Dispotæa multilineata* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 80.

*Crucibulum multilineata* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 107, pl. xxv, fig. 7.

*Crucibulum multilineatum* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 276, fig. 192.

*Crucibulum multilineatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Crucibulum multilineatum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crucibulum multilineatum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 351.

*Description*.—"Subovate, depressed; apex prominent; one side with squamose lines, the opposite with finer ramose lines destitute of scales; diaphragm contracted." Conrad, 1842.

Height, 7 mm.; length, 30 mm.; width, 25 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run, 2 miles south of Governor Run, Flag Pond, Dover Bridge, Greensboro.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

Genus CALYPTRÆA Lamarck.

CALYPTRÆA APERTA (Solander).

Plate LIX, Fig. 1.

*Trochus apertus* Solander, 1766, Foss. Haut., p. 9, figs. 1, 2.

*Calyptrea trochiformis* Lamarck, 1804, Ann. Mus. d'Hist. Nat., vol. i, p. 385, pl. xv, fig. 3.

? *Infundibulum gyrinum* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 134.

*Infundibulum perarmatum* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 31.

*Infundibulum perarmatum* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 186.

*Infundibulum perarmatum* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 182.

*Infundibulum perarmatum* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 80, pl. xlv, fig. 6.

*Trochita perarmata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Trochita perarmata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Calyptrea trochiformis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 352.

*Infundibulum perarmatum* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 24, 25.

*Trochita perarmata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 124, pl. xxii, figs. 15-19.

*Description*.—"Trochus (*apertus*) testa gibboso-conica exasperata obliquata subtus concava, apertura augustata.

"Primo intuitu *Patellis* assimilatur illisque quæ *Labio interno* instructæ sunt, cfr. Linn. Syst. nat. n. 654-658. Specimina autem perfecta *spiram* ostendunt completam, *aufractus* licet pauciores quam in congeneribus; *Apertura* etjam magis contracta est.

"Testa magnitudine Juglandis sed depressior, sæpeque minor; tabulæ imposita conum formans gibbosiusculum, quo etjam a congeneribus differt; externe scabra, subtus lævis, concava.

"Apertura augustata, lateribus magis roduntatis quam in reliquis hujus generis." Solander, 1766.

Height, 20 mm.; diameter, 35 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro. CALVERT FORMATION. Church Hill, 3 miles west of Centerville, Reed's, Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach, White's Landing.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

#### CALYPTREA CENTRALIS (Conrad).

Plate LIX, Figs. 2a, 2b, 2c.

*Infundibulum centralis* Conrad, 1841, Amer. Jour. Sci., vol. xli, p. 348.

*Infundibulum concentricum* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 6.

*Infundibulum centralis* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 80, pl. xlv, fig. 5.

*Calyptrea (Infundibulum) concentricum* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 249, pl. xxxv, fig. 39.

*Trochita centralis* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 109, pl. xxv, fig. 8.

*Trochita centralis* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 276, fig. 139.

*Trochita centralis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Trochita concentrica* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 568.

*Trochita centralis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Trochita concentrica* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Calyptrea centralis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 353.

*Description*.—"Obtusely ovate, with fine concentric irregular lines; apex central." Conrad, 1841.

"Suborbicular or obtusely ovate, tumid above, marked with transverse wrinkles; apex medial, minutely spiral, prominent, acute." Conrad, 1845.

This species is distinguished by the entire absence of spines and the presence of the irregular spiral lines or wrinkles, and also by a peculiar reflected lip on the septum, under which is an umbilicus on the columella.

Height, 10 mm.; diameter, 18 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

#### CALYPTREA GREENSBOROËNSIS n. sp.

Plate LIX, Figs. 3a, 3b.

*Description*.—Shell small, depressed, globose, very eccentric, three-whorled; sutures indistinct, especially on the later whorls; whorls con-

vex; surface covered with irregular, closely-set, beaded, vermicular riblets; subseptal umbilicus large and flaring.

Height, 5 mm.; length, 11 mm.; width, 9 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

Genus CREPIDULA Lamarck.

CREPIDULA FORNICATA (Linné).

Plate LIX, Figs. 4a, 4b.

*Patella fornicata* Linné, 1759, Syst. Nat., ed. x, p. 781.

*Crepidula fornicata* Lamarck, 1801, Anim. sans Vert., vol. vii, p. 641.

*Crepidula fornicata* ? var. Say, 1822, Jour. Acad. Nat. Sci. Phila., vol. ii, 1st ser., p. 225.

*Crepidula densata* Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. i, p. 311.

*Crepidula ponderosa* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 6.

*Crepidula cornucopie* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 6.

*Crepidula cymbæformis* Conrad, 1844, Proc. Acad. Nat. Sci. Phila., vol. ii, p. 173.

*Calyptrea (Crepidula) ponderosa* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 249, pl. xxxv, fig. 40.

*Calyptrea (Crepidula) cornucopie* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 250, pl. xxxv, fig. 41.

*Crypta fornicata* Tuomey and Holmes, 1857, Pleiocene Fossils of South Carolina, p. 110, pl. xxv, fig. 9.

*Crepidula fornicata* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 276, fig. 194.

*Crypta cymbæformis* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 81, pl. xlv, fig. 7.

*Crypta densata* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 81, pl. xlv, fig. 9.

*Crypta fornicata* Conrad, 1861, Fossils of the Medial Tertiary, No. 4, p. 81, pl. xlv, fig. 10.

*Crypta cornucopia* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Crypta cymbæformis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Crypta densata* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Crypta fornicata* ? Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Crypta cornucopia* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crypta cymbiformis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crypta densata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crypta fornicata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Crepidula rostrata* Conrad, 1870, Amer. Jour. Conch., vol. vi, p. 77.

*Crepidula virginica* Conrad, 1870, Amer. Jour. Conch., vol. vi, p. 78.

*Crepidula recurvirostra* Conrad, 1870, Amer. Jour. Conch., vol. vi, p. 78.

*Crepidula fornicata* Meyer, 1888, Proc. Acad. Nat. Sci. Phila., vol. xl, p. 170.

*Crepidula fornicata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 356.

*Crepidula fornicata* ? Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 123.

*Description*.—"P. testa integra ovali postice oblique recurva, labio postico concavo." Linné, 1758.

This species shows great variability, as is testified by the synonyms cited above.

Length, 28 mm.; width, 22 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point. CHOPTANK FORMATION. Jones Wharf, Greensboro, St. Leonard Creek, Sand Hill. CALVERT FORMATION. Plum Point, 3 miles west of Centerville.

*Collection*.—Maryland Geological Survey.

#### CREPIDULA PLANA Say.

Plate LIX, Figs. 5a, 5b.

*Crepidula plana* Say, 1822, Jour. Acad. Nat. Sci. Phila., vol. ii, 1st ser., p. 226.

*Crepidula lamina* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 6.

*Calyptraea (Crepidula) lamina* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 250, pl. xxxv, fig. 42. (*Fide* Dall.)

*Crypta plana* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 111, pl. xxv, fig. 12.

*Crepidula plana* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 276, fig. 195.

*Crypta plana* ? Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Crypta plana* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 16.

*Crepidula plana* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 358.

*Crepidula plana* ? Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 124.

*Description*.—"Shell depressed, flat, oblong oval, transversely wrinkled, lateral margins abruptly deflected; *apex* not prominent, and constituting a mere terminal angle, obsolete in the old shells; *within* white; *diaphragm* occupying half the length of the shell, convex, contracted in the middle and at one side.

"Length 1 and 1-10 of an inch." Say, 1822.

The forms from Plum Point differ from the other Maryland forms in possessing a very thick shell.

Length, 25 mm.; width, 16 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.



## Family AMALTHEIDÆ.

Genus AMALTHEA Schumacher.

AMALTHEA MARYLANDICA n. sp.

Plate LIX, Figs. 6a, 6b, 6c, 6d.

*Description*.—Shell small, irregular in shape; apex very posteriorly situated (overhanging the margin), elevated, arched, and dextrally twisted; surface with irregular lines of growth, and numerous, closely-set, alternating, granulated ribs; base irregular; margin smooth.

Height, 3 mm.; length, 9 mm.; width, 7.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro, Jones Wharf.*Collection*.—Maryland Geological Survey.

## Family XENOPHORIDÆ.

Genus XENOPHORA Fischer.

XENOPHORA CONCHYLIPHORA (Born).

Plate LIX, Figs. 7a, 7b, 7c.

*Trochus conchyliophorus* Born, 1780, Testacea Musei Cæsarei Vindobonensis, p. 333, pl. xii, figs. 21, 22.

*Xenophora humilis* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. iii, pt. i, p. 182, pl. iv, figs. 10, 10a. (Not of Conrad.)

*Xenophora conchyliophora* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 360.

*Description*.—"Testa convexo-conica, tenuis, sub-pellucida, testis Zoophytorum & Testaceorum adglutinatis onerati; Anfractibus declivis, imbricati, plicato-rugosi; Apertura compressa, subquadrangularis; Labrum integerrimum, falcatum; Labium horizontale, reflexum, imperforatum; Color albus, radiis obliquis curvatis luteis." Born, 1780.

This species has survived without essential change from the Cretaceous to the Recent.

Height, unknown; diameter, 43 mm.

*Occurrence*.—CHOPTANK FORMATION. Governor Run (lower bed). CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

## Family NATICIDÆ.

Genus POLYNICES Montfort.

Subgenus NEVERITA Risso.

## POLYNICES (NEVERITA) DUPLICATUS (Say).

Plate LX, Fig. 1.

*Natica duplicata* Say, 1822, Jour. Acad. Nat. Sci. Phila., vol. ii, 1st ser., p. 247.*Natica duplicata* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.*Natica duplicata* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 185, 186.*Natica (Neverita) duplicata* ? Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 564.*Neverita duplicata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.*Polynices (Neverita) duplicatus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 368.*Natica duplicata* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xiv, pp. 25, 26, 28.*Neverita duplicata* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 121, pl. xxi, figs 13-16.

*Description*.—"Shell thick, sub-globose, cinereous, with a black line revolving on the spire above the suture, and becoming gradually diluted, dilated, and obsolete in its course; within brownish-livid; a large incrassated callus of the same color extends beyond the columella, and nearly covers the umbilicus from above; *umbilicus* with a profound sulcus or duplication." Say, 1822.

Height, 45 mm.; diameter, 52 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Dover Bridge, Greensboro, Peach Blossom Creek, Jones Wharf, Governor Run, 2 miles south of Governor Run. CALVERT FORMATION. Plum Point, Church Hill.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

Subgenus LUNATIA Gray.

## POLYNICES (LUNATIA) HEMICRYPTUS\* (Gabb).

Plate LX, Fig. 2.

*Natica hemicrypta* Gabb, 1860, Jour. Acad. Nat. Sci. Phila., vol. iv, 2nd ser., p. 375, pl. lxvii, fig. 5.*Polynices (Lunatia) hemicryptus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 371.*Natica (Lunatia) hemicrypta* Whitfield, 1894, Mon. xxiv, p. 118, pl. xxii, figs. 1-5.Not *Natica hemicrypta* Conrad.

*Description*.—"Globose; whorls four, rounded; spire elevated, suture faint; mouth rounded; callosity small, partly covers the umbilicus, which is deep, surface smooth." Gabb, 1860.

Height, 15 mm.; diameter, 11 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point, Church Hill, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

### POLYNICES (LUNATIA) HEROS (Say).

Plate LX, Figs. 3, 4.

*Natica heros* Say, 1822, Jour. Acad. Nat. Sci. Phila., vol. ii, 1st ser., p. 248.

*Natica interna* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 125, pl. vii, fig. 2. (Reprint, Bull. Amer. Pal., No. 5.)

*Natica heros* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Natica heros* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 185.

*Natica (Lunatia) catenoides* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565. (Not of Wood.)

*Natica (Lunatia) interna* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Lunatia catenoides* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19. (Not of Wood.)

*Lunatia interna* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.

*Lunatia catenoides* ? Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 258, pl. xxiii, fig. 5.

*Polynices (Lunatia) internus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 372, pl. xx, fig. 7.

*Polynices (Lunatia) perspectivus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 373.

*Polynices (Lunatia) heros* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 373.

*Natica heros* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, pp. 25, 27, 28.

*Natica (Lunatia) heros* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 119, pl. xxii, figs. 9, 10.

*Description*.—"Shell suboval, thick, rufo-cinereous; *within* whitish; *columella* incrassated; *callous* not continued over the upper part of the umbilicus, hardly extending beyond a line drawn from the base of the columella to the superior angle of the labrum; *umbilicus* free, simple." Say, 1822.

Dr. Dall says in regard to this species as restricted by him: "This species is somewhat variable, and the difference between the sexes is very marked. In a pair from Nova Scotia having each a height of 50 mm.

the male measured 40 mm. in maximum diameter and the female 45 mm. The difference in form is even greater than these measurements would imply. The deep-water specimens are thin but growing to a very large size. This species is especially subject to decortication in the fossil state, and when so mutilated is difficult to recognize. Perfect adult specimens can usually be identified by their globose form, rounded but not turreted whorls, small ribless umbilicus and feeble callus. The young resemble *L. interna*, but want the umbilical rib, though it is sometimes quite difficult to separate immature specimens."

Dr. Dall also recognized *interna* Say and *perspectiva* Rogers as distinct species occurring in the Maryland Miocene. In regard to the former he says: "*Lunatia interna* may be discriminated by its low spire, its full and rounded whorls, and by the characters of the umbilicus, which shows a marked sulcus ascending spirally below a thickened, obscure rib, which are respectively indicated in mature and perfect specimens by an emargination and a callus on the pillar-lip. It has six or eight whorls, and attains a breadth of 26 and a height of 28 mm."

He defines *perspectiva* as follows:

"This is *N. heros* Conrad, *ex parte, non* Say, and *N. hemicrypta* Conrad, *ex parte*, not of Gabb. The species is much the same shape as *L. triserialis* Say, of the recent fauna, but is larger, heavier, and with a different umbilicus. It may be recognized by its smoothly arched spire, in which the rotundity of the whorls is not marked and the suture is smoothly appressed, as in a male *Neverita duplicata* of the elevated variety; by its umbilicus, which is wide below and obscurely spirally striate, with near the top of the umbilical wall a sharp, narrow spiral rib, which terminates between two obscure notches on the columellar callus. It is a narrower, heavier and smaller shell than the average adult *L. heros*, though decorticated specimens such as abound in the marls are difficult to recognize."

After a very careful study of large collections from all the Maryland horizons and localities it has been impossible to separate the material into the species recognized and re-defined by Dr. Dall, and it appears best for the present at least to refer all the fossil forms to *L. heros*.

Height, 65 mm.; diameter, 60 mm.

*Occurrence.*—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf, Governor Run, 2 miles south of Governor Run, Pawpaw Point, Flag Pond, Dover Bridge, Sand Hill. CALVERT FORMATION. Plum Point, 3 miles west of Centerville, Fairhaven.

*Collections.*—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

Genus *Sigaretus* Lamarck.

SIGARETUS FRAGILIS Conrad.

Plate LX, Figs. 5a, 5b.

*Natica fragilis* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 222, pl. ix, fig. 3.

*Sigaretus fragilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 181.

*Natica aperta* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 7.

*Natica aperta* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 254, pl. xxxvi, fig. 51.

*Natica fragilis* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 267, fig. 153.

*Sigaretus (Naticina) fragilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 565.

*Sigaretus fragilis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 19.

*Sigaretus fragilis* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 25.

*Description.*—"Shell ovate, thin, fragile, smooth, with fine revolving impressed striæ; spire very small; apex acute; aperture extending about four-fifths of the length of the shell; columella much narrowed and arcuated, exhibiting the internal volutions." Conrad, 1830.

Height, 22 mm.; width, 18 mm.

*Occurrence.*—ST. MARY'S FORMATION. St. Mary's River, Cove Point. CHOPTANK FORMATION. Governor Run (lower bed). CALVERT FORMATION. Plum Point.

*Collections.*—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.



## Superfamily RHIPIDOGLOSSA.

## Family TROCHIDÆ.

Genus CALLIOSTOMA Swainson.

CALLIOSTOMA BELLUM (Conrad).

Plate LXI, Fig. 1.

*Trochus bellus* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 137.*Zizyphinus bellus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.*Zizyphinus bellus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.*Calliostoma bellum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 395.

*Description*.—"Shell conical, with prominent beaded spiral striæ; whorls slightly contracted above; periphery rounded; base with about eight large beaded elevated spiral striæ. Length half an inch." Conrad, 1834.

Height, 16 mm.; diameter, 14 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Wagner Free Institute of Science, Cornell University.

CALLIOSTOMA PHILANTHROPUS (Conrad).

Plate LXI, Figs. 2, 3.

*Trochus philanthropus* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 137.*Trochus philanthropus* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 117, pl. xxvi, fig. 2.*Trochus philanthropus* Emmons, 1858, Geology of North Carolina, p. 272, fig. 167.*Zizyphinus philanthropus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.*Zizyphinus philanthropus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.*Calliostoma philanthropus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 390, pl. xviii, fig. 9a.

*Description*.—"Shell subconical, with the whorls slightly angular near their base; and with prominent spiral beaded lines, alternating in size; striæ on the base nearly smooth, not crenulated; subumbilicated; aperture obliquely quadrangular." Conrad, 1834.

This is one of the commonest and most variable of all the species of *Calliostoma* in the Atlantic Coast Miocene. The typical forms have three prominent beaded spirals with sometimes intermediate smaller

spirals without beads. The periphery is square and sometimes somewhat concave. The base has about six broad spirals and additional smaller ones in the umbilical region which is always imperforate though sometimes slightly excavated.

The species is subject to considerable variation, which consists usually in the loss of the beads on some of the spirals.

Height, 12 mm.; diameter, 12 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point. CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), 2 miles south of Governor Run, Pawpaw Point, Greensboro. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

#### CALLIOSTOMA PHILANTHROPUS VAR.

Plate LXI, Fig. 4.

*Description*.—Earlier whorls with three spirals, the one below the suture coarsely beaded, the medial one with smaller, more closely set beads, the lower over-ridden by several revolving ribs which are each finely beaded; finer imbedded spirals on all except the earliest whorls; periphery of the body whorl with a revolving concavity between the lowest spiral described above and a slightly less prominent one which is hidden on all except the body whorl; base of the body whorl with seven broad spirals.

Later investigation may show that this is a distinct species, but as a single specimen is all that has been found, its distinctness or relationships cannot now be decided.

Length, 10 mm.; diameter, 9 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Pawpaw Point.

*Collection*.—Maryland Geological Survey.

#### CALLIOSTOMA VIRGINICUM (Conrad).

Plate LXI, Fig. 5.

*Zizyphinus virginicus* Conrad, 1875, Rept. N. Car. Geol. Survey, vol. 1, Appendix A, p. 22, pl. iv, fig. 4.

*Calliostoma virginicum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 396, pl. xviii, fig. 2.

*Description*.—"Trochiform; spire and last volution equal in height; 2 prominent revolving lines on last volution immediately above the aperture, the upper one having a slight channel where it joins the volution, another line near the suture and only two lines on each of the other volutions at top and base; suture carinated; base with four large revolving lines on ribs and other unequal finer lines; subumbilicated." Conrad, 1875.

Shell of moderate size, solid, six-whorled; sculpture consisting of fine lines of growth, of numerous elevated closely-set revolving striæ and of three pronounced revolving ribs—one basal on which the whorl is wound and two equally distant from the sutures and with about half the width of the whorl between them; base with about nine broad raised flat-topped revolving ribs with narrower interspaces between them.

Height, 10 mm.; diameter, 10 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Wagner Free Institute of Science, Cornell University.

#### CALLIOSTOMA DISTANS (Conrad).

##### Plate LXI, Fig. 6.

*Leiotrochus distans* Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 288.

*Monilia (Leiotrochus) distans* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Monilea (Leiotrochus) distans* Meck, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Zizyphinus punctatus* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 257, pl. iii, fig. 5.

*Zizyphinus bryani* Conrad, 1868, Amer. Jour. Conch., vol. iii, p. 258, pl. xxi, fig. 9.

*Calliostoma (Eutrochus) distans* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 402.

*Description*.—"Trochiform; volutions 4; suture subcanaliculate near the apex; revolving lines, a few distant, distinct, impressed, the others very fine; periphery rounded; base convex-depressed, with six distant impressed revolving lines and very fine intermediate lines; umbilicus narrow, profound; subcarinated at base." Conrad, 1862.

Height, 10.5 mm.; diameter, 11 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

## CALLIOSTOMA EBOREUM (Wagner).

## Plate LXI, Fig. 7.

*Trochus eboeus* Wagner, 1839, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 52, pl. ii, fig. 5.

*Monilia (Leiotrochus) eboea* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Monilea (Leiotrochus) eboea* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Turbo eboeus* Hellprin, 1887, Proc. Acad. Nat. Sci. Phila., vol. xxxix, pp. 399, 404.

*Calliostoma eboeum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 398.

*Monilea (Leiotrochus) eboea* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 135, pl. xxiv, figs. 7-10.

*Description*.—"Shell smooth and slightly polished; spire short, conical; whorls flattened laterally, margined above by a very obtuse obsolete carina; spiral lines obsolete; periphery sharply angulated, subcarinated; base flattened; subumbilicated columella grooved; aperture half the length of the shell." Wagner, 1839.

Dr. Dall says in regard to this species: "This species is a typical *Calliostoma*, with a rather angular periphery which forms a line over the suture below it, a polished surface, mostly smooth, with a few fine but distinct, elevated spiral threads, rather irregularly disposed and sometimes absent. The base is generally smooth, flattish, imperforate, with the usual arched pillar ending in an obscure projection (common to the genus) and a few spiral threads about the umbilical region. Old specimens have the last whorl less angular at the periphery, the base rounded and the aperture less quadrate than in smaller specimens. The threading is irregular and occasionally profuse or entirely absent."

This species may readily be confused with *C. wagneri* and *C. aphelium*. It is possible that the latter is the normal form of the adult.

Height, 6 mm.; diameter, 6.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. 3 miles south of Chesapeake Beach, Reed's, Westcott Farm near Church Hill.

*Collections*.—Maryland Geological Survey, U. S. National Museum, Wagner Free Institute of Science.

## CALLIOSTOMA WAGNERI Dall.

Plate LXI, Fig. 8.

*Calliostoma (eboreum* Wagner var. ?) *Wagneri* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 399, pl. xxi, fig. 3.

*Description*.—"Shell small, rather depressed, with a rather large, smooth nucleus and five subsequent whorls; surface of the shell smooth except for lines of growth; whorls at the periphery flattened, with two well-separated keels, the upper the more prominent; the suture in the earlier whorls is applied to the upper keel, but gradually recedes from it and runs about midway between them; immediately in front of the suture the whorl shows a narrow, rounded ridge parallel with the suture; between this ridge and the upper peripheral keel the surface of the whorl is excavated or impressed to an extent varying in different specimens; base smooth, umbilical region with a wrinkled callus, sometimes bounded by one or two spiral grooves, but often without them; pillar short, thick, with an obscure denticle; aperture subquadrate, outer lip simple, throat not lirated." Dall, 1892.

Height, 8.5 mm.; diameter, 10 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro, Governor Run (lower bed).

*Collections*.—Maryland Geological Survey, U. S. National Museum.

## CALLIOSTOMA APHELIUM Dall.

Plate LXI, Figs. 9, 10a, 10b, 11.

*Calliostoma aphelium* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 400, pl. xxii, fig. 29.

*Description*.—"Shell small, somewhat depressed, with five whorls; suture impressed, not channelled; upper surface of the whorls smooth except for lines of growth and nearly invisible obsolete spiral markings, somewhat flattened; periphery prominent, almost carinated; base slightly rounded, without sculpture; umbilicus represented by a deep imperforate pit; umbilical fasciole strong, callous, irregularly vertically striated; aperture subquadrate, outer lip simple, sharp; inner lip broad, with a callous knob upon it; body with a thin wash of callus." Dall, 1892.

There is a subsutural row of white spots, and another row in the center of the base.



Height, 10 mm.; diameter, 11 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run (lower bed), 2 miles south of Governor Run, Cordova.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Wagner Free Institute of Science.

CALLIOSTOMA PERALVEATUM (Conrad).

Plate LXI, Fig. 12.

*Trochus peralveatus* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 30.

*Trochus peralveatus* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 186.

*Trochus peralveatus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 182, 183.

*Trochus peralveatus* Conrad, 1846, Proc. Acad. Nat. Sci. Phila., vol. iii, p. 21, pl. i, fig. 25.

*Zizyphinus peralveatus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Zizyphinus peralveatus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Description*.—"Volutions 5 or 6, with each a deep groove near the base; space below the suture profoundly and widely channelled; upper margin of whirls acutely carinated; base with 5 profound grooves. Length,  $1\frac{5}{8}$  inch." Conrad, 1842.

Length, 13 mm.; diameter, 12 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences, U. S. National Museum, Cornell University.

Section EUTROCHUS A. Adams.

CALLIOSTOMA HUMILE (Conrad).

Plate LXI, Figs. 13a, 13b, 13c.

*Trochus humilis* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser. p. 219, pl. ix, fig. 5.

*Trochus humilis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

? *Trochus lens* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 10.

? *Trochus lens* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 265, pl. xxxvii, fig. 83.

*Zizyphinus humilis* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Zizyphinus humilis* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Calliostoma (Eutrochus) humile* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 405. (In part.)

*Description*.—"Shell depressed, with very fine transverse striæ; sides straight; whorls with a very slight obtuse elevation revolving immediately above the suture; apex acute; aperture rhomboidal; umbilicated.

"The specimen from which the above description was taken exhibits part of the original markings; a band of light-colored minute spots revolves near the suture on the large whorl; and another band of similar, but larger spots revolves near the middle of the same volution; the striæ are very strong on the base, particularly near the umbilical margin." Conrad, 1830.

The color pattern referred to by Conrad has been observed on a number of specimens. A specimen belonging to the Wagner Free Institute of Science has three rows of spots, one just below the suture and two near the center of the whorl.

This is the most abundant species at St. Mary's River.

*C. conus* H. C. Lea differs from this species in being more elevated, in having more convex whorls, and a rounded basal margin.

Height, 13 mm.; diameter, 20 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

#### CALLIOSTOMA RECLUSUM (Conrad).

Plate LXI, Figs. 14a, 14b, 14c.

*Trochus reclusus* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 219, pl. ix, fig. 6.

*Trochus reclusus* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187.

*Zizyphinus reclusus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 569.

*Zizyphinus reclusus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 15.

*Calliostoma (Eutrochus) humilis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 405. (In part.)

*Description*.—"Shell much depressed; transversely striated; whorls flattened on the summit, with straight sides; aperture transversely ovate; umbilicus profound, carinated and slightly funnel-shaped.

"The carina within the umbilicus is visible on the two last whorls." Conrad, 1830.

This species is distinguished from *C. humile* by the flat-topped, beaded shoulder of the whorls.

Height, 15 mm.; diameter, 20 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, Wagner Free Institute of Science, Cornell University.

CALLIOSTOMA MARYLANDICUM n. sp.

Plate LXI, Figs. 15a, 15b.

*Description*.—Shell small, depressed, umbilicate; spire much depressed, domed; body whorl large; mouth round; top of the whorl with six sharply incised revolving lines; lines of growth faint; body whorl with faint oblique streaks of color.

Height, 7 mm.; diameter, 5.4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—U. S. National Museum.

CALLIOSTOMA CALVERTANUM n. sp.

Plate LXI, Figs. 16a, 16b, 16c.

*Description*.—Shell small, much depressed, umbilicate; spire conic; periphery with a concave groove above, below which the whorl is wound; earlier whorls with three revolving ribs which gradually become obsolete; surface of later whorls smooth, highly polished, marked only by very fine closely-set lines of growth and still finer revolving striæ; base slightly convex; umbilicus large and deep; umbilical periphery angular; mouth subquadrate.

Height, 3.5 mm.; diameter, 6 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

Family UMBONIIDÆ.

Genus TEINOSTOMA Adams.

TEINOSTOMA NANUM (Lea).

Plate LXII, Figs. 1a, 1b, 1c, 2a, 2b, 2c.

*Rotella nana* Lea, 1833, Contrib. to Geology, p. 214, pl. vi, fig. 225.

*Rotella umbilicata* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst. p. 10.

*Rotella umbilicata* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 264, pl. xxxvi, fig. 80.

*Description*.—"Shell orbicular, flattened above, smooth, margin rounded; substance of the shell rather thin; spire nearly concealed; outer lip sharp; callus impressed in the centre, bounded by a fine impressed line; mouth nearly round." Lea, 1833.

This species may be readily distinguished from the other *Teinostomas* of the Maryland Miocene by its smooth, highly-polished shell, and by the thick smooth callus which fills the umbilicus and which is bounded by a faint impressed revolving line.

Height, 1 mm.; maximum diameter, 2 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point.

*Collections*.—Maryland Geological Survey, Philadelphia Academy of Natural Sciences, Cornell University.

#### TEINOSTOMA CALVERTENSE n. sp.

Plate LXII, Figs. 3a, 3b, 3c.

*Description*.—Shell small, solid, much depressed; body whorl large, gently convex on top; spire small, domed; umbilicus small; mouth round; surface marked by rather strong, somewhat irregular lines of growth.

This species resembles *T. nanum* more closely than it does any other Maryland species. It differs from *nanum* in having an open umbilicus and in being much more depressed.

Height, 0.5 mm.; diameter, 1.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Governor Run, CALVERT FORMATION. Plum Point, Church Hill.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

#### TEINOSTOMA LIPARUM (H. C. Lea).

Plate LXII, Figs. 4a, 4b, 4c.

*Delphinula lipara* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 9.

*Delphinula lipara* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 261, pl. xxxvi, fig. 71.

*Description*.—"Shell orbicular, depressed, somewhat flattened, rather thick, smooth, shining; spire very short, rounded; sutures impressed; whorls five, convex, polished; last whorl rounded; base smooth; umbilicus very wide, deep; mouth round." Lea, 1845.

Height, 1 mm.; maximum diameter, 3 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Wagner Free Institute of Science, Cornell University.

TEINOSTOMA GREENSBOROËNSE n. sp.

Plate LXII, Figs. 5a, 5b, 5c.

*Description*.—Shell small, depressed, umbilicate; spire small, prominent; suture distinct; body whorl large, convex on top; periphery acute; mouth circular; umbilicus deep; surface with fine oblique revolving striæ and oblique radiating undulations which are very prominent on the sides and base of the body whorl.

This species resembles *T. undula* Dall.

Height, 0.6 mm.; diameter, 2 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro, Cordova, Jones Wharf.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

Genus COCHLIOLEPIS Stimpson.

COCHLIOLEPIS STRIATA Dall.

Plate LXII, Figs. 6a, 6b, 6c.

*Cochliolepis striata* Dall, 1889, Rept. Blake Gastr., Bull. Mus. Comp. Zool. Harvard, vol. xviii, p. 360.

*Cochliolepis striata* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 419, pl. xxiii, figs. 16, 17.

*Description*.—"A second species, larger and fewer whorled, has strong spiral striæ like a minute *Sigaretus perspectivus*, and was named *C. striata* by Stimpson in his manuscripts. It is about 6.5 mm. in greatest diameter and 1.5 mm. high. It has two whorls and a globular nucleus almost enveloped by the last whorl, and a very wide perverse umbilicus." Dall, 1889.

This species is very rare at Plum Point, and has not been found at any other locality at as low a geological horizon or as far north as this. Dr. Dall records it as living in Tampa Bay, and occurring fossil in the younger Miocene of North Carolina.



Maximum diameter, 4.6 mm.; height, 1.2 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point.

*Collection*.—U. S. National Museum.

### Family CYCLOSTREMATIDÆ.

Genus MOLLERIA Jeffreys.

#### MOLLERIA MINUSCULA Dall.

Plate LXII, Fig. 7.

*Molleria minuscula* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 421.

*Description*.—"Shell very small, with the general form of *Lunatia interna* Say, turbinate, fully rounded, with two and a half whorls; surface smooth, suture distinct, not deep; base rounded; umbilicus very small; aperture rounded, hardly thickened, the margin internally with a perceptible ledge for the edge of the operculum." Dall, 1892.

No specimen except the type has been found, but the species is so small that very careful search should be made for it.

Height, 0.7 mm.; diameter, 1.0 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collection*.—U. S. National Museum.

## Superfamily ZYGobranchia.

### Family FISSURELLIDÆ.

#### Subfamily EMARGINULINÆ.

Genus FISSURIDEA Swainson.

#### FISSURIDEA ALTICOSTA (Conrad).

Plate LXIII, Figs. 1a, 1b.

*Fissurella alticosta* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 142.

*Fissurella alticosta* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 78, pl. xliv, fig. 7.

*Fissurella alticosta* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Fissurella alticostata* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.

*Fissuridea redimicula* var. *alticosta* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 425.

*Description*.—"Shell ovate, elevated, cancellated, with about seventeen elevated ribs and intermediate prominent striæ; the middle one largest; apex inclined, not nearly central; fissure regularly oval." Conrad, 1834.

"Subovate, with very prominent remote narrow ribs, about 18 or 20 in number, with intermediate unequal striæ, the middle one largest; foramen large, subovate; inner margin crenulated, angulated at the ends of the ribs." Conrad, 1845.

Height, 18 mm.; length, 35 mm.; width, 18 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collections*.—Wagner Free Institute of Science, Philadelphia Academy of Natural Sciences.

#### FISSURIDEA GRISCOMI (Conrad).

Plate LXIII, Figs. 2a, 2b, 3a, 3b.

*Fissurella Griscomi* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 143.

*Fissurella Griscomi* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 78, pl. xlv, fig. 8.

*Fissurella Griscomi* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Fissurella Griscomi* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.

*Fissuridea Griscomi* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 425.

*Fissurella Griscomi* Whitfield, 1894, Mon. xxiv, U. S. Geol. Survey, p. 136, pl. xxiv, figs. 11-14.

*Description*.—"Shell ovate-oval, compressed, rather elevated, cancellated; radiating ribs crowded, somewhat alternated in size; fissure oblong, inclined, nearest to the anterior end; within somewhat thickened on the margin which is crenulated; an impressed submarginal line." Conrad, 1834.

"Subovate, elevated, laterally compressed, with alternate radiating robust striæ, and strong prominent transverse lines; foramen narrow, subovate; inner margin crenulated." Conrad, 1845.

Height, 10 mm.; length, 24 mm.; width, 14.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf, Pawpaw Point. CALVERT FORMATION. Church Hill, 3 miles west of Centerville.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

## FISSURIDEA MARYLANDICA (Conrad).

Plate LXIII, Figs. 4a, 4b.

*Fissurella Marylandica* Conrad, 1841, Proc. Acad. Nat. Sci. Phila., vol. i, p. 31.*Fissurella Marylandica* Conrad, 1842, Jour. Acad. Nat. Sci. Phila., vol. viii, 1st ser., p. 187.*Fissurella marylandica* Conrad, 1842, Proc. Nat. Inst., Bull. ii, pp. 182, 183.*Fissurella Marylandica* Conrad, 1845, Fossils of the Medial Tertiary, No. 4, p. 79, pl. xlv, fig. 1.*Fissurella Marylandica* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.*Fissurella marylandica* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.*Fissuridea catilliformis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 425. (In part.)Not *F. catilliformis* Rogers.*Fissurella marylandica* Harris, 1893, Amer. Jour. Sci., ser. iii, vol. xlv, p. 25.

*Description*.—"Elevated, with numerous striæ, alternated in size and minutely granulated by fine crowded concentric lines crossing them; foramen large, regularly oval. Length 1 inch.

"Closely allied to *F. Griscomi*, but is readily distinguished by a much larger foramen, finer concentric lines, in not being laterally compressed, &c." Conrad, 1841.

Height, 20 mm.; length, 43 mm.; width, 29 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Chesapeake Beach, Fairhaven.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, Philadelphia Academy of Natural Sciences, U. S. National Museum.

## FISSURIDEA NASSULA (Conrad).

Plate LXIII, Figs. 5a, 5b.

*Fissurella nassula* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 78, pl. xlv, fig. 6.*Fissurella nassula* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.*Fissurella nassula* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.*Fissuridea catilliformis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 425. (In part.)Not *F. catilliformis* Rogers.

*Description*.—"Subovate, not elevated; sides flattened, cancellated with numerous closely-arranged unequal ribs and prominent transverse striæ; foramen subovate, rather large; inner margin crenulated." Conrad, 1845.

Height, 19 mm.; length, 48 mm.; width, 34 mm.

*Occurrence*.—ST. MARY'S FORMATION (?). "St. Mary's River" (*vide* Conrad). CHOPTANK FORMATION. Jones Wharf, Governor Run, 2 miles south of Governor Run, Greensboro, Dover Bridge.

*Collections*.—Maryland Geological Survey, Johns Hopkins University.

#### FISSURIDEA REDIMICULA (Say).

##### Plate LXIII, Fig. 6.

*Fissurella redimicula* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 132, pl. viii, fig. 1. (Reprint, 1896, Bull. Amer. Pal., No. 5.)

*Fissurella redimicula* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 78.

Not *Fissurella redimicula* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 113, pl. xxv, fig. 14.

*Fissurella redimicula* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 277, fig. 196.

*Fissurella redimicula* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Fissurella redimicula* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.

*Fissuridea redimicula* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 425.

*Description*.—"Ovate-oval a little oblong, conic-convex, with approximate longitudinal striæ; foramen ovate-oval, inclined.

"Longitudinal striæ slender, numerous, granulated, approximate; the granulations of the striæ give the appearance of concentric obsolete lines: *aperture*, inner margin crenate; thickened inner margin of the foramen truncate at one end." Say, 1824.

The typical form of this species, with uniform sculpture is not authentically known from Maryland, although the type is supposed to have come from the St. Mary's River. Possibly *F. alticosta* Conrad should be considered a variety or a synonym of this species.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River.

*Collection*.—British Museum.

#### Genus EMARGINULA Lamarck.

##### EMARGINULA MARYLANDICA n. sp.

##### Plate LXIII, Figs. 7a, 7b.

*Description*.—Shell small, moderately thick, depressed; apex slightly posterior to the center; base oval; anterior slope broadly and regularly convex; posterior slope shorter, strongly concave above, straight for the

lower two-thirds; sculpture consisting of about 30 raised rounded radiating ribs with intermediate smaller ones toward the periphery of the posterior end, and with rugose irregular lines of growth; notch nearly medial; interior smooth; margins of the notch thickened; the thickening extending nearly to the apex in a belt which is slightly depressed in the center; periphery slightly thickened.

Height, 2.5 mm.; length, 6.5 mm.; width, 5.5 mm.

*Occurrence*.—CHOPTANK FORMATION. Greensboro.

*Collection*.—Maryland Geological Survey.

## CLASS AMPHINEURA.

### Order POLYPLACOPHORA.

#### Suborder MESOPLACOPHORA.

##### Family ISCHNOCHITONIDÆ.

Genus CHÆTOPLEURA Shuttleworth.

##### CHÆTOPLEURA APICULATA (Say).

Plate LXIV, Figs. 1a, 1b, 2a, 2b, 2c.

*Chiton apiculatus* Say, 1834 (?), American Conchology, Appendix.

*Chiton transenna* H. C. Lea, 1843, New Fossil Shells from the Tertiary of Virginia, Abst., p. 5.

*Chiton transenna* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 246, pl. xxxv, fig. 35.

*Description*.—"Valves eight; dorsal triangles with series of elevated points; lateral triangles with scattered elevated points.

"Inhabits the coast of South Carolina.

"Whitish; oval-oblong, convex, subcarinated; eight-valved; anterior valve with numerous, separate, elevated, equal, subequidistant, points; the six following valves have on their dorsal triangles from twenty to thirty longitudinal series of equal, elevated, approximate rounded points; their lateral triangles with elevated points, as on the anterior valve; posterior valve at base like the dorsal triangles, its broad margin with the points like those of the anterior valve. Length nearly half an inch." Say, 1834.

This species which is living on the Atlantic coast from Cape Cod to



Florida, was described by H. C. Lea from the Miocene of Petersburg, Virginia, as *Chiton transenna* n. sp. Lea's types which consist of a tail valve and several medial valves, show the identity of the Virginia form with the recent species and with the Maryland fossils.

*Occurrence*.—CALVERT FORMATION. Plum Point, 3 miles south of Chesapeake Beach.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

## CLASS SCAPHOPODA.

### Order SOLENOCONCHIA.

#### Family DENTALIIDÆ.

##### Genus DENTALIUM Linné.

##### DENTALIUM ATTENUATUM Say.

##### Plate LXIV, Fig. 3.

*Dentalium attenuatum* Say, 1824, Jour. Acad. Nat. Sci. Phila., vol. iv, 1st ser., p. 154, pl. viii, fig. 3. (Reprint, 1896, Bull. Amer. Pal., No. 5.)

*Dentalium attenuatum* Conrad, 1830, Jour. Acad. Nat. Sci. Phila., vol. vi, 1st ser., p. 211.

*Dentalium dentalis* Conrad, 1842, Proc. Nat. Inst., Bull. ii, p. 187. (Not of Lamarck.)

*Dentalium dentale* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 78, pl. xlv, fig. 9.

*Dentalium attenuatum* Tuomey and Holmes, 1856, Pleiocene Fossils of South Carolina, p. 105, pl. xxv, fig. 1.

*Dentalium attenuatum* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 274, fig. 188.

*Dentalium attenuatum* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Dentalium attenuatum* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.

*Dentalium attenuatum* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 439.

*Description*.—"Arcuated; surface marked with from twelve to sixteen rounded ribs, intervening grooves simple; lines of growth numerous, distinct; aperture orbicular." Say, 1824.

Length, 39 mm.; diameter, 3.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Langley's Bluff. CHOPTANK FORMATION. Jones Wharf. CALVERT FORMATION. Plum Point, Chesapeake Beach.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

DENTALIUM DANAI Meyer.

Plate LXIV, Fig. 4.

*Dentalium Danai* Meyer, 1885, Amer. Jour. Sci., ser. iii, vol. xxix, p. 462.

*Dentalium Danai* Meyer, 1886, Ala. Geol. Survey, Bull. i, pt. ii, p. 64, pl. iii, figs. 2, 2a.

*Dentalium Danai* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 439.

*Description*.—"Smooth, section circular; smaller aperture with additional tube; margin distinctly notched on the convex side of the shell; slightly emarginate on the concave side." Meyer, 1886.

Length, 68 mm.; diameter, 4 mm.

*Occurrence*.—CALVERT FORMATION. Plum Point, Chesapeake Beach, 3 miles south of Chesapeake Beach, Truman's Wharf.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Cornell University.

DENTALIUM CADULOIDE Dall.

Plate LXIV, Figs. 5a, 5b.

*Dentalium caduloide* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 442, pl. xxiii, fig. 25.

*Description*.—"Shell small, thin, slightly curved, smooth but not polished, marked only with incremental lines which cross the tube somewhat obliquely; shell cylindrical, posterior orifice small, circular, the margin without notch or sulcus, rarely even perceptibly deviating from a circle except when worn or chipped." Dall, 1892.

Length, 12 mm.; diameter (maximum), 1.3 mm., (minimum) 0.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. St. Mary's River, Cove Point, Langley's Bluff. CHOPTANK FORMATION. Greensboro, Jones Wharf. CALVERT FORMATION. Plum Point.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum.

Genus CADULUS Philippi.

CADULUS THALLUS (Conrad).

Plate LXIV, Fig. 6.

*Dentalium thallus* Conrad, 1834, Jour. Acad. Nat. Sci. Phila., vol. vii, 1st ser., p. 142.

*Dentalium thallus* Conrad, 1845, Fossils of the Medial Tertiary, No. 3, p. 78, pl. xlii, fig. 5.

*Dentalium thallus* H. C. Lea, 1845, Trans. Amer. Philos. Soc., vol. ix, p. 230.

*Dentalium thallus* Tuomey and Holmes, 1857, Pleiocene Fossils of South Carolina, p. 106, pl. xxv, fig. 3.

*Dentalium thallus* Emmons, 1858, Rept. N. Car. Geol. Survey, p. 274, fig. 190.

*Dentalium thallus* Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. xiv, p. 570.

*Dentalium ? thallus* Meek, 1864, Miocene Check List, Smith. Misc. Coll. (183), p. 14.

*Cadulus thallus* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 445.

*Description*.—"Shell slightly curved, smooth, highly polished; swelling below the middle; aperture very regularly oval." Conrad, 1834.

"Subulate, slightly curved, smooth, polished, tumid below the middle." Conrad, 1845.

Length, 7 mm.; diameter, 1.5 mm.

*Occurrence*.—ST. MARY'S FORMATION. Cove Point. CHOPTANK FORMATION. Dover Bridge, Pawpaw Point, Peach Blossom Creek, Greensboro, Governor Run (lower bed), Trappe Landing, Jones Wharf. CALVERT FORMATION. Plum Point, 3 miles south of Chesapeake Beach, Reed's.

*Collections*.—Maryland Geological Survey, Johns Hopkins University, U. S. National Museum, Philadelphia Academy of Natural Sciences, Cornell University.

CADULUS NEWTONENSIS Meyer and Aldrich.

Plate LXIV, Fig. 7.

*Cadulus Newtonensis* Meyer and Aldrich, 1886, Cin. Jour. Nat. Hist., vol. ix, No. 2, p. 40, pl. ii, figs. 3a, 3b.

*Cadulus newtonensis* Dall, 1892, Trans. Wagner Free Inst. Sci., vol. iii, pt. ii, p. 444.

*Description*.—"Two depressed fragments from Newton show an aperture which is different from the other known apertures of *Cadulus* of the Southern Eocene. Two distant deep notches on the convex side, and two less distant emarginations on the concave side of the shell divide the

margin of the elliptical aperture into four appendages, of which the two small opposite ones are equal, the two larger ones, however, very unequal." Meyer and Aldrich, 1886.

Length, 7.5 mm.; diameter, 1.1 mm.

*Occurrence*.—CHOPTANK FORMATION. Jones Wharf.

*Collections*.—Maryland Geological Survey, U. S. National Museum.

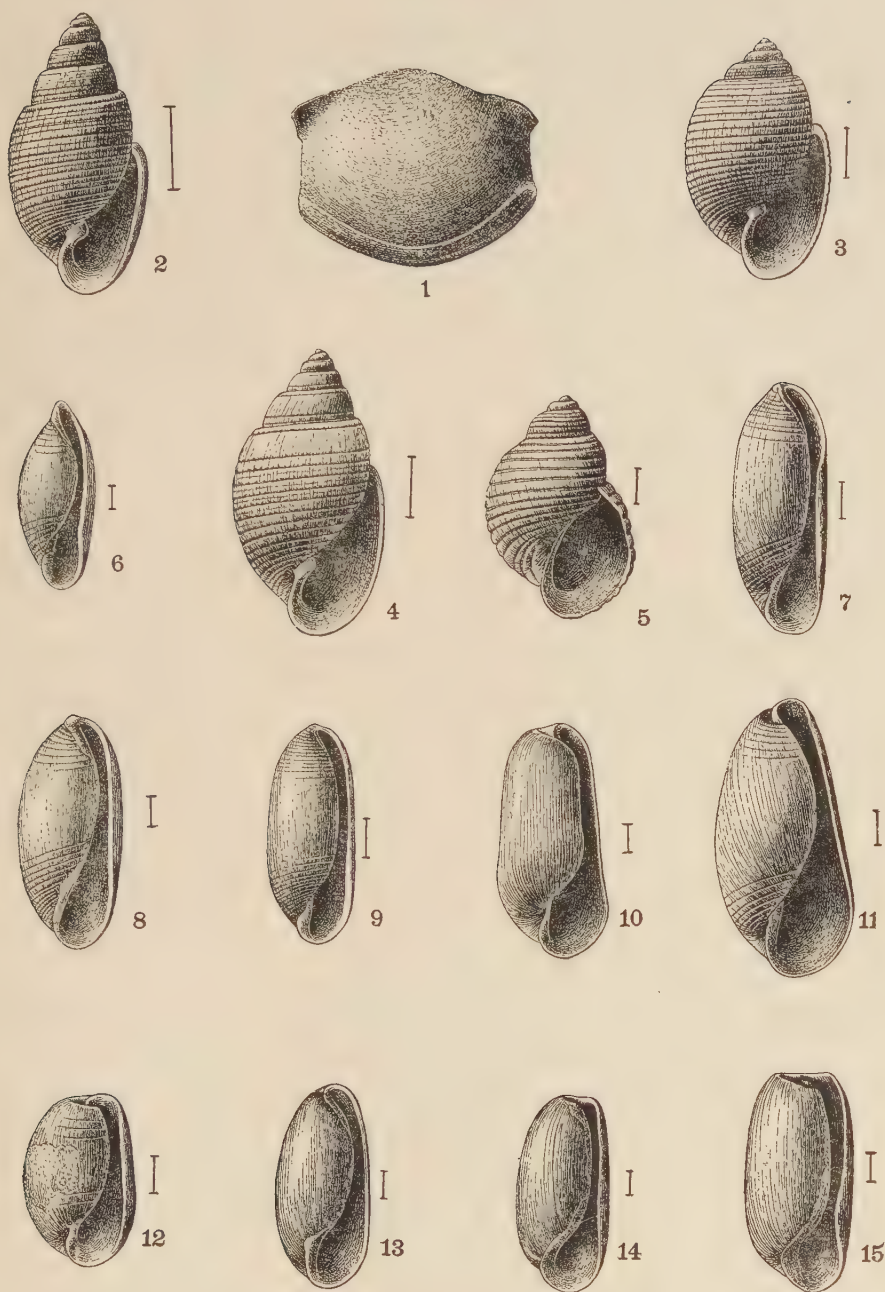
## VITA

George Curtis Martin was born July 18, 1875, in Cheshire, Massachusetts. His secondary education was obtained in the public schools of Adams, Massachusetts. In July, 1892, he was field assistant on the U. S. Geological Survey for a short time. In September, 1894, he entered the general science course at Cornell University and was graduated with the degree of B. S. in 1898. In the spring of 1897 he was employed at the Academy of Natural Sciences of Philadelphia as paleontological assistant. During the summers of 1897 and 1898 he was a member of the geological expeditions sent out by Cornell University under Professor G. D. Harris to collect fossils in the Paleozoic of New York and the Tertiary of the southern Atlantic Coast States. In July, 1898, he published in the *American Journal of Science* a paper entitled "*An Occurrence of Dunite in Western Massachusetts.*" In September, 1898, he entered the Johns Hopkins University and has taken the course of study offered in the Geological Department by Professors Clark, Reid and Mathews, and the minor courses in biology under Dr. E. A. Andrews. During the year 1898-1899 he held a student assistantship, in 1899-1900 a graduate scholarship, and in 1900-1901 a fellowship.

In the summer of 1899 and 1900 and for other irregular periods he has been assistant geologist on the Maryland Geological Survey. He is junior author of a monograph on the Eocene Deposits and Paleontology of Maryland, and has in preparation a paper on the Stratigraphy and Economic Geology of Garrett County.



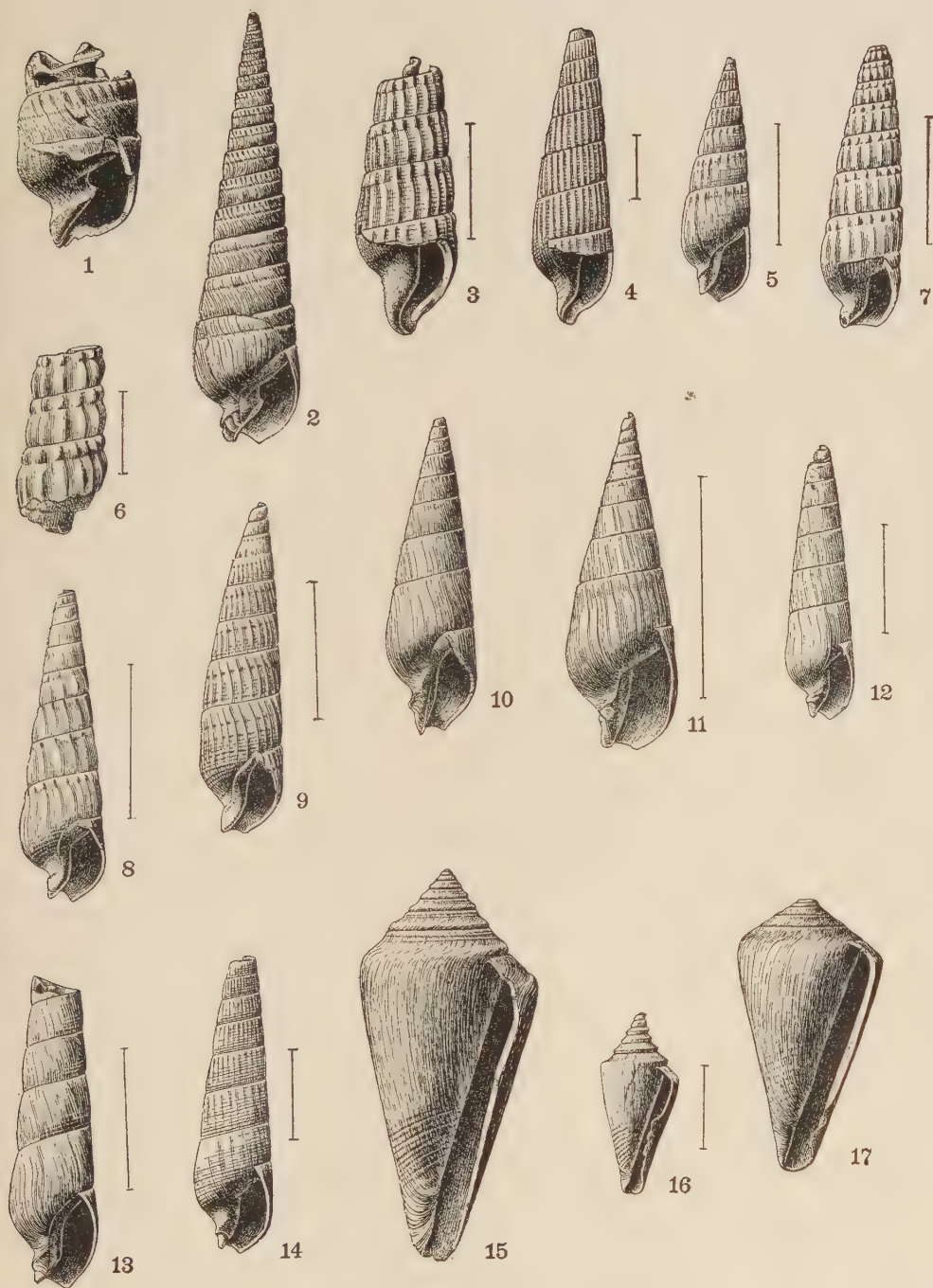




MOLLUSCA—CEPHALOPODA AND GASTROPODA.

PLATE XL.

|                                                                                                                 | PAGE     |
|-----------------------------------------------------------------------------------------------------------------|----------|
| Figs. 1, 2. <i>TEREBRA UNILINEATA</i> Conrad .....                                                              | 138      |
| 1. Ventral view of fragment. Plum Point.                                                                        |          |
| 2. Ventral view. Duplin County, North Carolina.                                                                 |          |
| Figs. 3, 4. <i>TEREBRA (ACUS) CURVILINEATA</i> Dall var. <i>WHITFIELDI</i> n. var.                              | 139, 140 |
| 3. View of one of the types of <i>T. curvilineata</i> Whitfield. Jericho,<br>New Jersey. U. S. National Museum. |          |
| 4. Ventral view. Plum Point.                                                                                    |          |
| Fig. 5. <i>TEREBRA (ACUS) CURVILINEATA</i> Dall var. <i>DALLI</i> n. var.....                                   | 139, 140 |
| 5. Ventral view. Greensboro.                                                                                    |          |
| Figs. 6, 7. <i>TEREBRA (ACUS) CURVILINEATA</i> Dall var. <i>CALVERTENSIS</i> n.<br>var. ....                    | 139, 141 |
| 6. View of fragment showing typical sculpture. Plum Point.                                                      |          |
| 7. Ventral view of more complete specimen. Same locality.                                                       |          |
| Fig. 8. <i>TEREBRA (ACUS) CURVILIRATA</i> Conrad .....                                                          | 141      |
| 8. Ventral view. St. Mary's River.                                                                              |          |
| Fig. 9. <i>TEREBRA (ACUS) SINCERA</i> Dall .....                                                                | 142      |
| 9. Ventral view of type. St. Mary's River. U. S. National Museum.                                               |          |
| Fig. 10. <i>TEREBRA (HASTULA) SIMPLEX</i> Conrad.....                                                           | 143      |
| 10. Ventral view. St. Mary's River.                                                                             |          |
| Fig. 11. <i>TEREBRA (HASTULA) SIMPLEX</i> Conrad var. <i>SUBLIRATA</i> Conrad...                                | 144      |
| 11. Ventral view. St. Mary's River.                                                                             |          |
| Figs. 12, 13. <i>TEREBRA (HASTULA) INORNATA</i> Whitfield.....                                                  | 144      |
| 12. Ventral view of a small specimen. St. Mary's River.                                                         |          |
| 13. Same view of a larger specimen showing revolving striae. Same<br>locality.                                  |          |
| Fig. 14. <i>TEREBRA (HASTULA) PATUXENTIA</i> n. sp.....                                                         | 145      |
| 14. Ventral view. Jones Wharf.                                                                                  |          |
| Figs. 15-17. <i>CONUS DILUVIANUS</i> Green .....                                                                | 145      |
| 15. Ventral view of large specimen. St. Mary's River.                                                           |          |
| 16. Ventral view of young individual. Same locality.                                                            |          |
| 17. Ventral view of abnormal specimen. Same locality. Cornell<br>University.                                    |          |



# PLATE XLI.

|                                                                   | PAGE |
|-------------------------------------------------------------------|------|
| Fig. 1. PLEUROTOMA (HEMIPLEUROTOMA) ALBIDA Perry.....             | 146  |
| 1. Ventral view. Jones Wharf.                                     |      |
| Figs. 2, 3. PLEUROTOMA (HEMIPLEUROTOMA) COMMUNIS Conrad.....      | 147  |
| 2. Ventral view of adult individual. Cove Point.                  |      |
| 3. Ventral view of young individual. Same locality.               |      |
| Figs. 4-6. PLEUROTOMA (HEMIPLEUROTOMA) COMMUNIS Conrad var. PRO-  |      |
| TOCOMMUNIS n. var. ....                                           | 147  |
| 4. Ventral view. Plum Point. Cornell University.                  |      |
| 5. Ventral view of larger specimen. Same locality.                |      |
| 6. Dorsal view of young individual. Same locality.                |      |
| Fig. 7. PLEUROTOMA (HEMIPLEUROTOMA) CHOPTANKENSIS n. sp. ....     | 148  |
| 7. Ventral view. Jones Wharf.                                     |      |
| Figs. 8, 9. PLEUROTOMA (HEMIPLEUROTOMA) BELLACRENATA Conrad.....  | 148  |
| 8. Ventral view of adult individual. Plum Point.                  |      |
| 9. Ventral view of young. Same locality. Cornell University.      |      |
| Figs. 10, 11. PLEUROTOMA (HEMIPLEUROTOMA) CALVERTENSIS n. sp..... | 149  |
| 10. Ventral view. Plum Point.                                     |      |
| 11. Ventral view showing the other extreme in sculpture. Same     |      |
| locality. U. S. National Museum.                                  |      |
| Figs. 12a, 12b. SURCULA RUGATA Conrad .....                       | 149  |
| 12a. Ventral view. Jones Wharf.                                   |      |
| 12b. Dorsal view of same specimen.                                |      |
| Fig. 13. SURCULA MARYLANDICA Conrad .....                         | 150  |
| 13. Ventral view. Plum Point.                                     |      |
| Fig. 14. SURCULA BISCATENARIA Conrad .....                        | 151  |
| 14. Ventral view. St. Mary's River.                               |      |
| Fig. 15. SURCULA ENGONATA Conrad.....                             | 151  |
| 15. Ventral view. St. Mary's River.                               |      |
| Fig. 16. SURCULA ROTIFERA Conrad .....                            | 152  |
| 16. Ventral view. St. Mary's River.                               |      |
| Fig. 17. SURCULA MARIANA n. sp.....                               | 152  |
| 17. Specimen from St. Mary's River.                               |      |





MOLLUSCA—GASTROPODA.

# PLATE XLII.

|                                                                                                                      | PAGE |
|----------------------------------------------------------------------------------------------------------------------|------|
| Figs. 1, 2. <i>MANGILIA PARVA</i> (Conrad) .....                                                                     | 153  |
| 1. Ventral view. Cove Point.                                                                                         |      |
| 2. Ventral view. Langley's Bluff.                                                                                    |      |
| Fig. 3. <i>MANGILIA PARVOIDEA</i> n. sp. ....                                                                        | 154  |
| 3. Ventral view. St. Mary's River.                                                                                   |      |
| Fig. 4. <i>MANGILIA CORNELLIANA</i> n. sp. ....                                                                      | 154  |
| 4. Ventral view. Plum Point. Cornell University.                                                                     |      |
| Fig. 5. <i>MANGILIA PATUXENTIA</i> n. sp. ....                                                                       | 154  |
| 5. View of specimen from Jones Wharf.                                                                                |      |
| Fig. 6. <i>MANGILLA (GLYPHOSTOMA) OBTUSA</i> n. sp. ....                                                             | 155  |
| 6. Ventral view. Plum Point.                                                                                         |      |
| Fig. 7. <i>DRILLIA INCILIFERA</i> (Conrad) .....                                                                     | 155  |
| 7. Ventral view. Cove Point.                                                                                         |      |
| Fig. 8. <i>DRILLIA INCILIFERA</i> var. <i>ANGULATA</i> n. var. ....                                                  | 156  |
| 8. Ventral view. St. Mary's River.                                                                                   |      |
| Fig. 9. <i>DRILLIA INCILIFERA</i> var. <i>DISTANS</i> (Conrad) .....                                                 | 156  |
| 9. Ventral view. St. Mary's River.                                                                                   |      |
| Fig. 10. <i>DRILLIA WHITFIELDI</i> n. sp. ....                                                                       | 157  |
| 10. Ventral view of type of <i>D. elegans</i> Whitfield (non Emmons).<br>Jericho. New Jersey. U. S. National Museum. |      |
| Fig. 11. <i>DRILLIA CALVERTENSIS</i> n. sp. ....                                                                     | 158  |
| 11. Specimen from Plum Point. U. S. National Museum.                                                                 |      |
| Figs. 12, 13. <i>DRILLIA LIMATULA</i> Conrad .....                                                                   | 158  |
| 12. Ventral view. St. Mary's River.                                                                                  |      |
| 13. Ventral view. Plum Point.                                                                                        |      |
| Figs. 14, 15. <i>DRILLIA LIMATULA</i> var. <i>DISSIMILIS</i> Conrad.....                                             | 159  |
| 14. Dorsal view. St. Mary's River.                                                                                   |      |
| 15. Ventral view. Same locality.                                                                                     |      |
| Fig. 16. <i>DRILLIA LIMATULA</i> var. <i>PYRAMIDALIS</i> n. var.....                                                 | 160  |
| 16. Ventral view. St. Mary's River.                                                                                  |      |
| Fig. 17. <i>DRILLIA PSEUDEBURNEA</i> (Whitfield) .....                                                               | 160  |
| 17. Ventral view. Plum Point.                                                                                        |      |



MOLLUSCA—GASTROPODA.

# PLATE XLIII.

|                                                                      | PAGE |
|----------------------------------------------------------------------|------|
| Figs. 1-3. CANCELLARIA ALTERNATA Conrad .....                        | 161  |
| 1. Ventral view. Jones Wharf.                                        |      |
| 2. Dorsal view. St. Mary's River.                                    |      |
| 3. Ventral view of the same specimen.                                |      |
| Fig. 4. CANCELLARIA ENGONATA Conrad .....                            | 162  |
| 4. Ventral view. Plum Point.                                         |      |
| Fig. 5. CANCELLARIA LUNATA Conrad .....                              | 163  |
| 5. Ventral view. St. Mary's River.                                   |      |
| Figs. 6a, 6b. CANCELLARIA PRUNICOLA n. sp. ....                      | 164  |
| 6a. Dorsal view. Plum Point.                                         |      |
| 6b. Ventral view of the same specimen.                               |      |
| Fig. 7. CANCELLARIA RETICULATOIDES Conrad .....                      | 164  |
| 7. Ventral view. Plum Point.                                         |      |
| Fig. 8. CANCELLARIA (ADMETE) MARYLANDICA n. sp. ....                 | 165  |
| 8. Ventral view. St. Mary's River.                                   |      |
| Fig. 9. CANCELLARIA (TRIGONOSTOMA) PERSPECTIVA Conrad .....          | 165  |
| 9. Ventral view. St. Mary's River. Wagner Free Institute of Science. |      |
| Fig. 10. CANCELLARIA (TRIGONOSTOMA) BIPLICIFERA Conrad .....         | 166  |
| 10. Ventral view. Jones Wharf.                                       |      |
| Figs. 11a, 11b. CANCELLARIA (SVELTIA) PATUXENTIA n. sp. ....         | 167  |
| 11a. Dorsal view. Jones Wharf.                                       |      |
| 11b. Ventral view of the same specimen.                              |      |
| Fig. 12. CANCELLARIA (SVELTIA) CALVERTENSIS n. sp. ....              | 167  |
| 12. Ventral view. Plum Point. U. S. National Museum.                 |      |
| Figs. 13a, 13b. CANCELLARIA (CANCELLARIELLA) NERITOIDEA n. sp. ....  | 168  |
| 13a. Ventral view. Jones Wharf.                                      |      |
| 13b. Dorsal view of the same specimen.                               |      |







# PLATE XLIV.

|                                                                         | PAGE |
|-------------------------------------------------------------------------|------|
| Figs. 1a, 1b. <i>OLIVA LITTERATA</i> Lamarck .....                      | 169  |
| 1a. Dorsal view. Church Hill.                                           |      |
| 1b. Ventral view of the same specimen.                                  |      |
| Figs. 2, 3. <i>OLIVA HARRISI</i> n. sp.....                             | 170  |
| 2. Ventral view of young individual. Plum Point. U. S. National Museum. |      |
| 3. Ventral view of larger specimen. Same locality.                      |      |
| Fig. 4. <i>MARGINELLA MINUTA</i> Pfeiffer .....                         | 170  |
| 4. Ventral view. Greensboro.                                            |      |
| Fig. 5. <i>MARGINELLA DENTICULATA</i> Conrad.....                       | 171  |
| 5. Ventral view. St. Mary's River.                                      |      |
| Fig. 6. <i>MARGINELLA CALVERTENSIS</i> n. sp.....                       | 172  |
| 6. Ventral view. Plum Point. U. S. National Museum.                     |      |
| Fig. 7. <i>SCAPHELLA SOLITARIA</i> (Conrad) .....                       | 173  |
| 7. Ventral view. Plum Point.                                            |      |
| Figs. 8, 9. <i>SCAPHELLA (AURINIA) MUTABILIS</i> (Conrad) .....         | 174  |
| 8. Ventral view. St. Mary's River.                                      |      |
| 9. Ventral view of another specimen. Same locality.                     |      |
| Fig. 10. <i>SCAPHELLA (AURINIA) TYPUS</i> (Conrad) .....                | 175  |
| 10. Ventral view. Jones Wharf.                                          |      |
| Fig. 11. <i>SCAPHELLA (AURINIA) OBTUSA</i> (Emmons) .....               | 175  |
| 11. Ventral view. (After Dall.)                                         |      |
| Fig. 12. <i>MITRA MARIANA</i> n. sp.....                                | 177  |
| 12. Ventral view. St. Mary's River. Wagner Free Institute of Science.   |      |



PLATE XLV.

|                                                         | PAGE |
|---------------------------------------------------------|------|
| Figs. 1a. 1b. <i>FULGAR SPINIGER</i> (Conrad) var. .... | 177  |
| 1a. Ventral view. Jones Wharf.                          |      |
| 1b. Dorsal view of the same specimen.                   |      |
| Figs. 2. 3a. 3b. <i>FULGAR FUSIFORME</i> Conrad.....    | 178  |
| 2. Dorsal view. St. Mary's River.                       |      |
| 3a. Ventral view. Cove Point.                           |      |
| 3b. Dorsal view of another specimen. Same locality.     |      |
| Figs. 4a. 4b. <i>FULGAR TUBERCULATUM</i> Conrad.....    | 179  |
| 4a. Dorsal view. St. Mary's River.                      |      |
| 4b. Ventral view of the same specimen.                  |      |



MOLLUSCA—GASTROPODA

# PLATE XLVI.

|                                                                        | PAGE |
|------------------------------------------------------------------------|------|
| Figs. 1a, 1b. <i>FULGAR CORONATUM</i> Conrad .....                     | 180  |
| 1a. Ventral view. St. Mary's River.                                    |      |
| 1b. Dorsal view of the same specimen.                                  |      |
| Figs. 2a, 2b. <i>FULGAR CORONATUM</i> var. <i>RUGOSUM</i> Conrad ..... | 181  |
| 2a. Dorsal view. St. Mary's River.                                     |      |
| 2b. Ventral view of the same specimen.                                 |      |





1a



1b



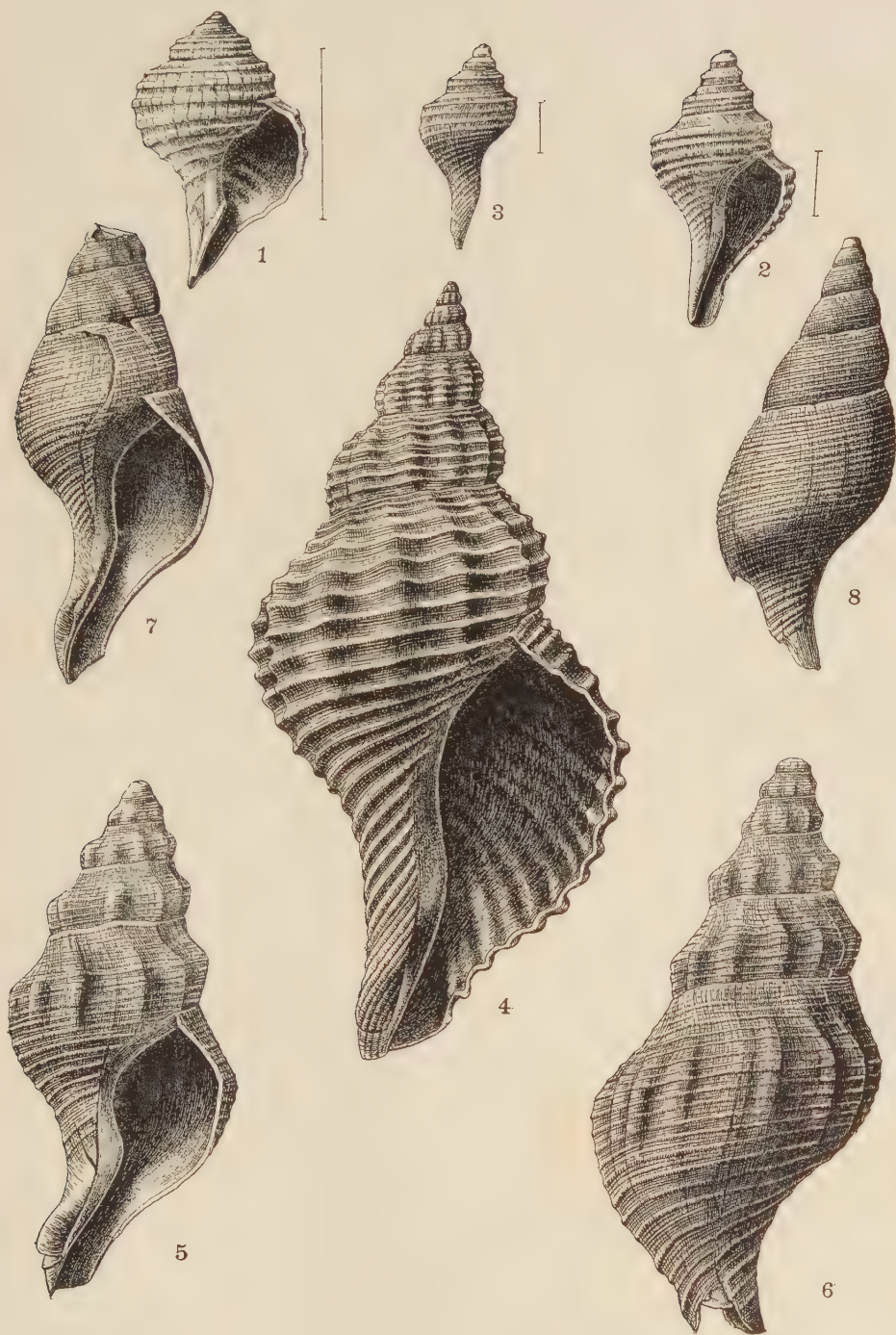
2a



2b

PLATE XLVII.

|                                                    | PAGE |
|----------------------------------------------------|------|
| Fig. 1. LIROSOMA SULCOSA Conrad .....              | 183  |
| 1. Ventral view. St. Mary's River.                 |      |
| Figs. 2, 3. CHRYSODOMUS PATUXENTENSIS n. sp.....   | 184  |
| 2. Ventral view. Jones Wharf.                      |      |
| 3. Dorsal view. Plum Point.                        |      |
| Fig. 4. BUCCINOFUSUS PARILIS Conrad.....           | 184  |
| 4. Ventral view. St. Mary's River.                 |      |
| Figs. 5, 6. SIPHONALIA DEVEXA (Conrad) .....       | 185  |
| 5. Ventral view. Plum Point.                       |      |
| 6. Dorsal view of another specimen. Same locality. |      |
| Figs. 7, 8. SIPHONALIA MIGRANS (Conrad) .....      | 186  |
| 7. Ventral view. Plum Point.                       |      |
| 8. Dorsal view of another specimen. Same locality. |      |



# PLATE XLVIII.

|                                                                                                                      | PAGE |
|----------------------------------------------------------------------------------------------------------------------|------|
| Figs. 1a, 1b. SIPHONALIA MARYLANDICA n. sp. ....                                                                     | 186  |
| 1a. Dorsal view. St. Mary's River.                                                                                   |      |
| 1b. Ventral view of the same specimen.                                                                               |      |
| Fig. 2. SIPHONALIA (?) CALVERTANA n. sp. ....                                                                        | 187  |
| 2. Specimen from Plum Point. U. S. National Museum.                                                                  |      |
| Figs. 3a, 3b, 4. PISANIA (CELATOCONUS) PROTRACTUS (Conrad).....                                                      | 188  |
| 3a. Dorsal view. Plum Point.                                                                                         |      |
| 3b. Ventral view of the same specimen.                                                                               |      |
| 4. Tip of a specimen from the same locality.     × 4                                                                 |      |
| Fig. 5. PTYCHOSALPINX ALTILIS (Conrad) .....                                                                         | 188  |
| 5. Ventral view. St. Mary's River.                                                                                   |      |
| Fig. 6. PTYCHOSALPINX MULTIRUGATA Conrad .....                                                                       | 189  |
| 6. Dorsal view. Plum Point. U. S. National Museum.                                                                   |      |
| Fig. 7. PTYCHOSALPINX LIENOSA Conrad .....                                                                           | 189  |
| 7. Ventral view. Plum Point.                                                                                         |      |
| Figs. 8, 9. ILYANASSA (?) (PARANASSA) PORCINA (Say).....                                                             | 190  |
| 8. Ventral view of type-specimen of <i>Buccinum porcinum</i> . St. Mary's<br>River (?). British Museum. (After Say.) |      |
| 9. Ventral view of type-specimen of <i>Buccinum aratum</i> . St. Mary's<br>River (?). British Museum. (After Say.)   |      |

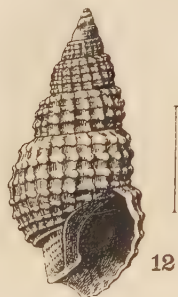
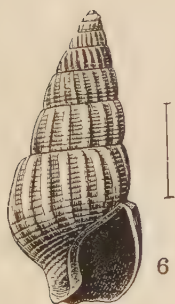






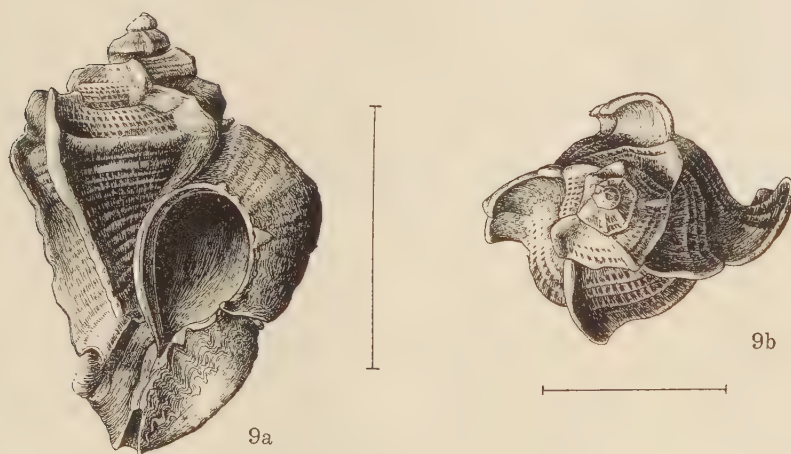
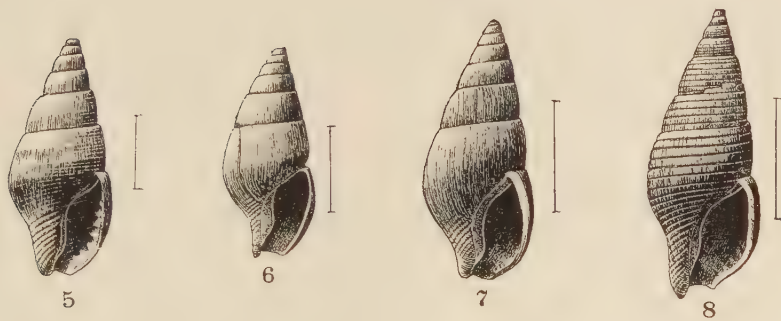
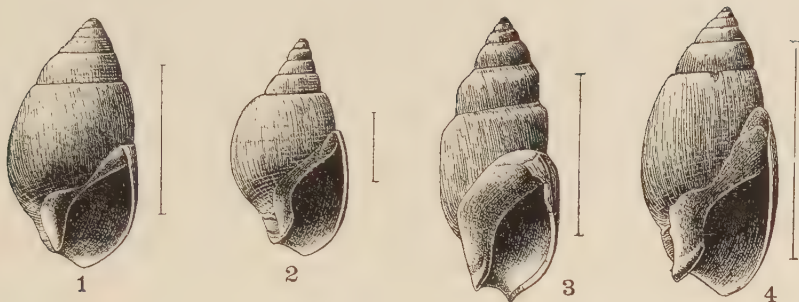
# PLATE XLIX.

|                                                             | PAGE |
|-------------------------------------------------------------|------|
| Fig. 1. <i>NASSA CALVERTENSIS</i> n. sp.....                | 191  |
| 1. Ventral view. Plum Point. U. S. National Museum.         |      |
| Fig. 2. <i>NASSA GUBERNATORIA</i> n. sp.....                | 192  |
| 2. Ventral view. Governor Run.                              |      |
| Figs. 3, 4. <i>NASSA TRIVITTATOIDES</i> (Whitfield) .....   | 192  |
| 3. Ventral view. Jones Wharf.                               |      |
| 4. Ventral view of another specimen. Same locality.         |      |
| Figs. 5a, 5b. <i>NASSA GREENSBOROËNSIS</i> n. sp.....       | 194  |
| 5a. Dorsal view. Greensboro.                                |      |
| 5b. Ventral view of the same specimen.                      |      |
| Figs. 6-8. <i>NASSA MARYLANDICA</i> n. sp.....              | 194  |
| 6. Ventral view. St. Mary's River.                          |      |
| 7. Ventral view of another specimen. Same locality.         |      |
| 8. Ventral view of less elongate individual. Same locality. |      |
| Figs. 9, 10. <i>NASSA PERALTA</i> Conrad. ....              | 195  |
| 9. Ventral view. St. Mary's River.                          |      |
| 10. Dorsal view of another specimen. Same locality.         |      |
| Fig. 11. <i>NASSA PERALTOIDES</i> Conrad .....              | 195  |
| 11. Ventral view. Jones Wharf.                              |      |
| Fig. 12. <i>NASSA TRIVITTATA</i> Say .....                  | 196  |
| 12. Ventral view Possibly from St. Mary's River.            |      |



# PLATE L.

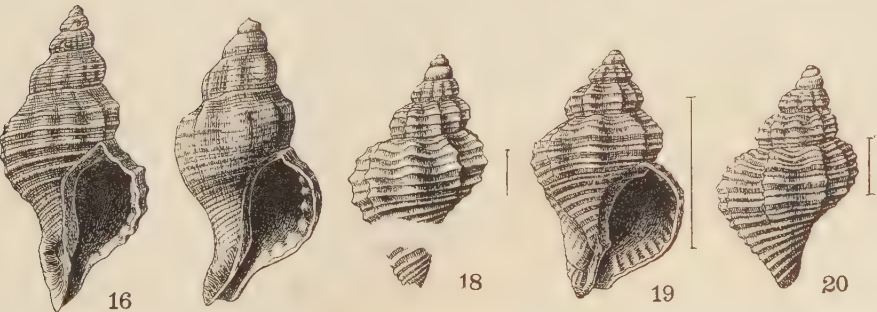
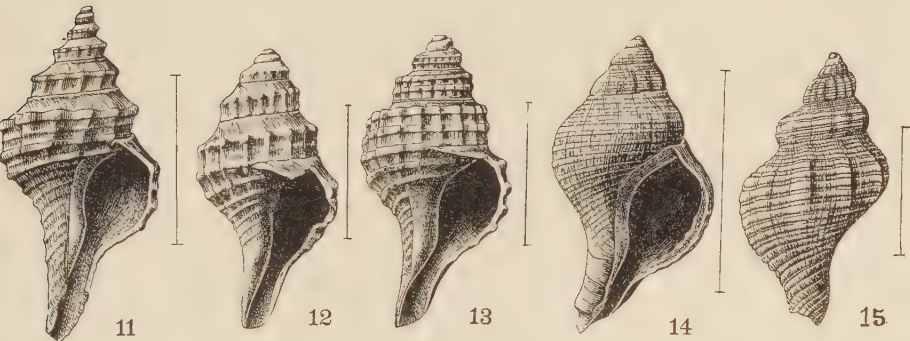
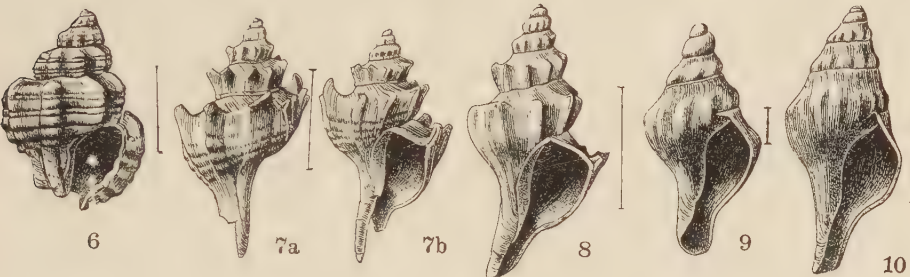
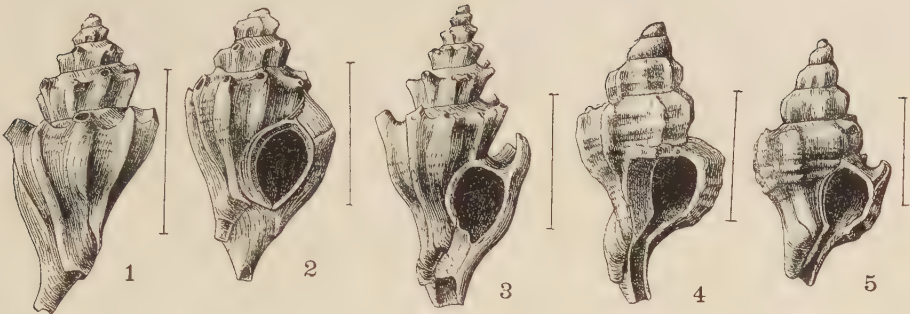
|                                                                             | PAGE |
|-----------------------------------------------------------------------------|------|
| Figs. 1, 2. <i>BULLIOPSIS INTEGRA</i> Conrad .....                          | 197  |
| 1. Ventral view of adult individual. St. Mary's River.                      |      |
| 2. Ventral view of young individual. Same locality.                         |      |
| Fig. 3. <i>BULLIOPSIS QUADRATA</i> Conrad .....                             | 198  |
| 3. Ventral view. St. Mary's River.                                          |      |
| Fig. 4. <i>BULLIOPSIS MARYLANDICA</i> Conrad .....                          | 198  |
| 4. Ventral view. Cove Point.                                                |      |
| Figs. 5-7. <i>COLUMBELLA (ASTYRIS) COMMUNIS</i> (Conrad) .....              | 199  |
| 5. Ventral view. Cove Point.                                                |      |
| 6. Ventral view. St. Mary's River.                                          |      |
| 7. Ventral view of another specimen. Same locality.                         |      |
| Fig. 8. <i>COLUMBELLA CALVERTENSIS</i> n. sp. ....                          | 200  |
| 8. Ventral view. Plum Point. U. S. National Museum.                         |      |
| Figs. 9a, 9b. <i>MUREX (PTERORHYTIS) CONRADI</i> Dall. ....                 | 200  |
| 9a. Ventral view. St. Mary's River. (After Dall.) U. S. National<br>Museum. |      |
| 9b. Apical view of the same specimen. (After Dall.)                         |      |



# PLATE LI.

|                                                               | PAGE |
|---------------------------------------------------------------|------|
| Figs. 1-3. <i>TYPHIS ACUTICOSTA</i> Conrad .....              | 201  |
| 1. Dorsal view. Cove Point.                                   |      |
| 2. Ventral view. Same locality.                               |      |
| 3. Ventral view. Plum Point. U. S. National Museum.           |      |
| Figs. 4-6. <i>MURICIDEA SHILOHIENSIS</i> (Heilprin).....      | 202  |
| 4. Ventral view. Plum Point. Cornell University.              |      |
| 5. Ventral view of another specimen. Same locality.           |      |
| 6. Ventral view of another specimen. Same locality.           |      |
| Figs. 7a, 7b. <i>TROPHON TETRICUS</i> Conrad .....            | 202  |
| 7a. Dorsal view. St. Mary's River.                            |      |
| 7b. Ventral view of same specimen.                            |      |
| Fig. 8. <i>TROPHON TETRICUS</i> var. <i>LÆVIS</i> n. var..... | 203  |
| 8. Ventral view. St. Mary's River.                            |      |
| Figs. 9, 10. <i>TROPHON CHESAPEAKEANUS</i> n. sp.....         | 203  |
| 9. Ventral view of young individual. St. Mary's River.        |      |
| 10. Ventral view of adult. Same locality.                     |      |
| Figs. 11-13. <i>SCALASPIRA STRUMOSA</i> Conrad .....          | 204  |
| 11. Ventral view. Yorktown, Virginia.                         |      |
| 12. Ventral view. St. Mary's River.                           |      |
| 13. Ventral view. Cove Point.                                 |      |
| Figs. 14, 15. <i>UROSALPINX CINEREUS</i> (Say) ? .....        | 205  |
| 14. Ventral view. Cove Point.                                 |      |
| 15. Dorsal view of another specimen. Same locality.           |      |
| Figs. 16, 17. <i>UROSALPINX RUSTICUS</i> (Conrad) .....       | 206  |
| 16. Ventral view. St. Mary's River.                           |      |
| 17. Ventral view. Cove Point.                                 |      |
| Figs. 18-20. <i>CORALLIOPHILA CUMBERLANDIANA</i> (Gabb) ..... | 211  |
| 18. Dorsal view. St. Mary's River.                            |      |
| 19. Ventral view. Same locality.                              |      |
| 20. Dorsal view. Same locality.                               |      |





# PLATE LII.

|                                                                           | PAGE |
|---------------------------------------------------------------------------|------|
| Figs. 1-3. <i>ECPHORA QUADRICOSTATA</i> (Say) .....                       | 207  |
| 1. Ventral view. St. Mary's River.                                        |      |
| 2. Ventral view of young individual. Cove Point.                          |      |
| 3. Specimen from Maryland, after Lister ( <i>vide</i> Dillwyn).           |      |
| Fig. 4. <i>ECPHORA QUADRICOSTATA</i> var. <i>UMBILICATA</i> (Wagner)..... | 209  |
| 4. Ventral view. Jones Wharf.                                             |      |
| Figs. 5-8. <i>ECPHORA TRICOSTATA</i> n. sp.....                           | 209  |
| 5. Ventral view. Plum Point. U. S. National Museum.                       |      |
| 6. Ventral view of younger individual. Same locality.                     |      |
| 7. Ventral view of very young individual. Same locality.                  |      |
| 8. Ventral view of aberrant form. Same locality.                          |      |
| Figs. 9, 10. <i>ECPHORA TAMPAËNSIS</i> (Dall) .....                       | 210  |
| 9. Ventral view. Church Hill. U. S. National Museum. (After<br>Dall.)     |      |
| 10. Ventral view. Jones Wharf.                                            |      |



# PLATE LIII.

|                                                                 | PAGE |
|-----------------------------------------------------------------|------|
| Figs. 1, 2. <i>SCALA SAYANA</i> Dall .....                      | 212  |
| 1. Ventral view. St. Mary's River.                              |      |
| 2. Ventral view. Greensboro.                                    |      |
| Fig. 3. <i>SCALA MARYLANDICA</i> n. sp. ....                    | 213  |
| 3. Ventral view. Jones Wharf.                                   |      |
| Fig. 4. <i>SCALA (OPALIA) CALVERTENSIS</i> n. sp. ....          | 213  |
| 4. Ventral view. Plum Point. U. S. National Museum.             |      |
| Fig. 5. <i>SCALA (OPALIA) RETICULATA</i> n. sp. ....            | 214  |
| 5. Ventral view. Plum Point.                                    |      |
| Fig. 6. <i>SCALA (OPALIA) PRUNICOLA</i> n. sp. ....             | 214  |
| 6. Ventral view. Plum Point.                                    |      |
| Fig. 7. <i>SCALA (STHENORHYTIS) EXPANSA</i> Conrad.....         | 215  |
| 7. Ventral view. Jones Wharf. Wagner Free Institute of Science. |      |
| Fig. 8. <i>SCALA (STHENORHYTIS) PACHYPLEURA</i> Conrad .....    | 215  |
| 8. Ventral view. Plum Point.                                    |      |
| Figs. 9, 10. <i>EULIMA EBOREA</i> Conrad .....                  | 216  |
| 9. Ventral view. St. Mary's River.                              |      |
| 10. Ventral view of another specimen. Same locality.            |      |
| Fig. 11. <i>EULIMA LÆVIGATA</i> (H. C. Lea) .....               | 217  |
| 11. Ventral view. St. Mary's River.                             |      |
| Fig. 12. <i>EULIMA MIGRANS</i> Conrad .....                     | 217  |
| 12. Ventral view. Cove Point.                                   |      |
| Fig. 13. <i>NISO LINEATA</i> Conrad.....                        | 218  |
| 13. Ventral view. Plum Point.                                   |      |





MOLLUSCA—GASTROPODA.



# PLATE LIV.

|                                                                                 | PAGE |
|---------------------------------------------------------------------------------|------|
| Fig. 1. ODOSTOMIA (CHRYSTALLIDA) MELANOIDIS (Conrad) .....                      | 220  |
| 1. Ventral view. St. Mary's River. Cornell University.                          |      |
| Fig. 2. PYRAMIDELLA (CHRYSTALLIDA) GRANULATA (H. C. Lea) .....                  | 220  |
| 2. Ventral view of type specimen. Petersburg, Virginia. Acad. Nat. Sci., Phila. |      |
| Figs. 3, 4. ODOSTOMIA CONOIDEA (Brocchi) .....                                  | 219  |
| 3. Ventral view. Jones Wharf.                                                   |      |
| 4. Ventral view. St. Mary's River.                                              |      |
| Fig. 5. ODOSTOMIA (EVALIA) MARIANA n. sp. ....                                  | 221  |
| 5. Ventral view. St. Mary's River.                                              |      |
| Fig. 6. ODOSTOMIA (SYRNOLA) MARYLANDICA n. sp. ....                             | 221  |
| 6. Ventral view. St. Mary's River. Cornell University.                          |      |
| Figs. 7, 8. ODOSTOMA (PYRGULINA) CALVERTENSIS n. sp. ....                       | 221  |
| 7. Ventral view. Plum Point.                                                    |      |
| 8. Ventral view of another specimen. Same locality.                             |      |
| Figs. 9, 9a. EULIMELLA (ANISOCYCLA) MARYLANDICA n. sp. ....                     | 222  |
| 9. Ventral view. St. Mary's River.                                              |      |
| 9a. Nucleus of the same specimen, much enlarged.                                |      |
| Fig. 10. TURBONILLA (CHEMNITZIA) NIVIA Stimpson .....                           | 222  |
| 10. Ventral view. St. Mary's River.                                             |      |
| Figs. 11, 12. TURBONILLA (CHEMNITZIA) NIVEA Stimpson var. ....                  | 223  |
| 11. Ventral view. Cove Point.                                                   |      |
| 12. Ventral view. St. Mary's River.                                             |      |
| Figs. 13, 14. TURBONILLA (PYRGISCUS) INTERRUPTA (Totten) .....                  | 224  |
| 13. View of specimen from Greensboro.                                           |      |
| 14. Ventral view. St. Mary's River.                                             |      |
| Fig. 15. TURBONILLA (TRAGULA) GUBERNATORIA n. sp. ....                          | 224  |
| 15. Ventral view. Governor Run (lower bed).                                     |      |



# PLATE LV.

|                                                       | PAGE |
|-------------------------------------------------------|------|
| Figs. 1, 2. TRITONIUM CENTROSUM (Conrad) .....        | 225  |
| 1. Ventral view. Plum Point.                          |      |
| 2. Ventral view of younger individual. Same locality. |      |
| Fig. 3. PYRULA HARRISI n. sp. ....                    | 226  |
| 3. Ventral view. Plum Point.                          |      |
| Fig. 4. CASSIS CÆLATA Conrad .....                    | 226  |
| 4. Ventral view. St. Mary's River.                    |      |
| Fig. 5. ERATO PEREXIGUA (Conrad) .....                | 227  |
| 5. Ventral view. Plum Point. U. S. National Museum.   |      |
| Fig. 6. SEILA ADAMSII (H. C. Lea) .....               | 228  |
| 6. Ventral view. Plum Point.                          |      |
| Fig. 7. CERITHIOPSIS CALVERTENSIS n. sp. ....         | 229  |
| 7. Ventral view. Plum Point.                          |      |
| Fig. 8. CERITHIOPSIS SUBULATA (Montagu).....          | 230  |
| 8. Ventral view. Greensboro.                          |      |
| Fig. 9. GONIOBASIS MARYLANDICA n. sp. ....            | 230  |
| 9. Ventral view. St. Mary's River.                    |      |
| Fig. 10. CÆCUM CALVERTENSE n. sp. ....                | 231  |
| 10. Specimen from Church Hill.                        |      |
| Figs. 11, 12. CÆCUM PATUXENTIUM n. sp. ....           | 231  |
| 11. Specimen from Greensboro.                         |      |
| 12. Specimen from Governor Run (lower bed).           |      |
| Fig. 13. CÆCUM GREENSBOROËNSE n. sp. ....             | 231  |
| 13. Specimen from Greensboro.                         |      |
| Figs. 14, 15. VERMETUS GRANIFERUS (Say) .....         | 232  |
| 14. Specimen from Church Hill.                        |      |
| 15. Specimen from Jones Wharf.                        |      |
| Fig. 16. VERMETUS VIRGINICUS (Conrad) .....           | 232  |
| 16. Specimen from Plum Point.                         |      |



PLATE LVI.

|                                                      |     |
|------------------------------------------------------|-----|
| FIGS. 1, 2. <i>TURRITELLA INDENTA</i> Conrad .....   | 233 |
| 1. Ventral view. 3 miles south of Chesapeake Beach.  |     |
| 2. Ventral view. Plum Point.                         |     |
| Fig. 3. <i>TURRITELLA AQUISTRIATA</i> Conrad .....   | 234 |
| 3. Ventral view. Church Hill.                        |     |
| FIGS. 4-9. <i>TURRITELLA FLORIDA</i> Say .....       | 234 |
| 4. Ventral view of typical form. St. Mary's River.   |     |
| 5. Ventral view of typical form. Jones Wharf.        |     |
| 6. Specimen from Jones Wharf showing var. A.         |     |
| 7. Specimen from Plum Point showing var. B.          |     |
| 8. Specimen from same locality showing var. A.       |     |
| 9. Specimen of var. <i>octonaria</i> . Dover Bridge. |     |





1



2



3



4



5



6



9



7

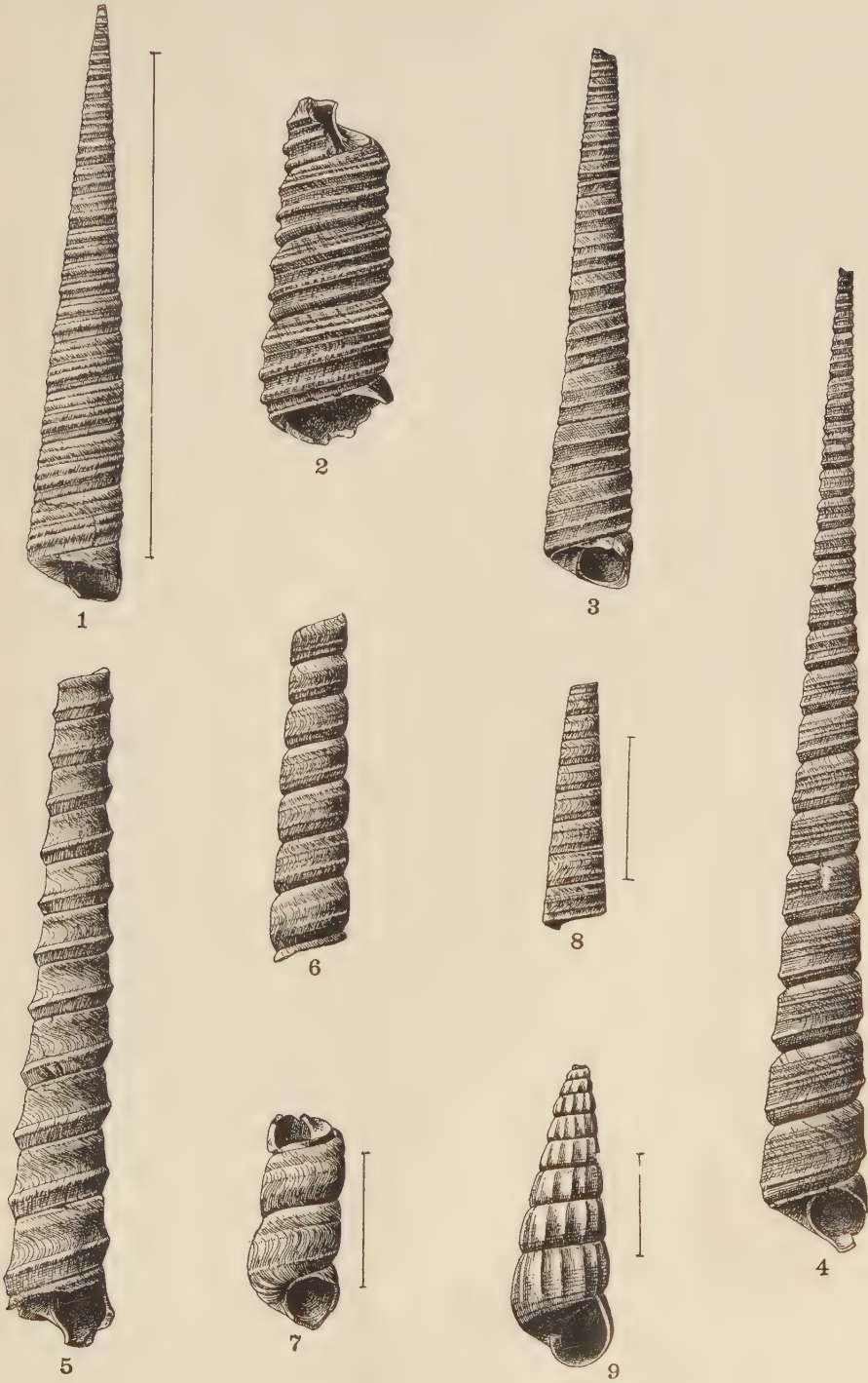


8

MOLLUSCA—GASTROPODA.

# PLATE LVII.

|                                                                               | PAGE |
|-------------------------------------------------------------------------------|------|
| Fig. 1. <i>TURRITELLA VARIABILIS</i> Conrad .....                             | 236  |
| 1. Specimen from St. Mary's River.                                            |      |
| Fig. 2. <i>TURRITELLA VARIABILIS</i> var. <i>ALTICOSTATA</i> Conrad.....      | 237  |
| 2. Specimen from Dover Bridge.                                                |      |
| Figs. 3, 4. <i>TURRITELLA VARIABILIS</i> var. <i>CUMBERLANDIA</i> Conrad..... | 237  |
| 3. Specimen from Plum Point.                                                  |      |
| 4. Another specimen from the same locality.                                   |      |
| Fig. 5. <i>TURRITELLA VARIABILIS</i> var. <i>EXALTATA</i> Conrad .....        | 238  |
| 5. Specimen from Plum Point.                                                  |      |
| Figs. 6-8. <i>TURRITELLA VARIABILIS</i> var.....                              | 239  |
| 6. Specimen of var. B. Plum Point.                                            |      |
| 7. Another specimen of the same. Same locality.                               |      |
| 8. Specimen of var. C. Plum Point.                                            |      |
| Fig. 9. <i>TACHYRHYNCHUS PERLAQUEATUS</i> (Conrad) .....                      | 239  |
| 9. Ventral view of type specimen. "Calvert Cliffs." Acad. Nat. Sci., Phila.   |      |

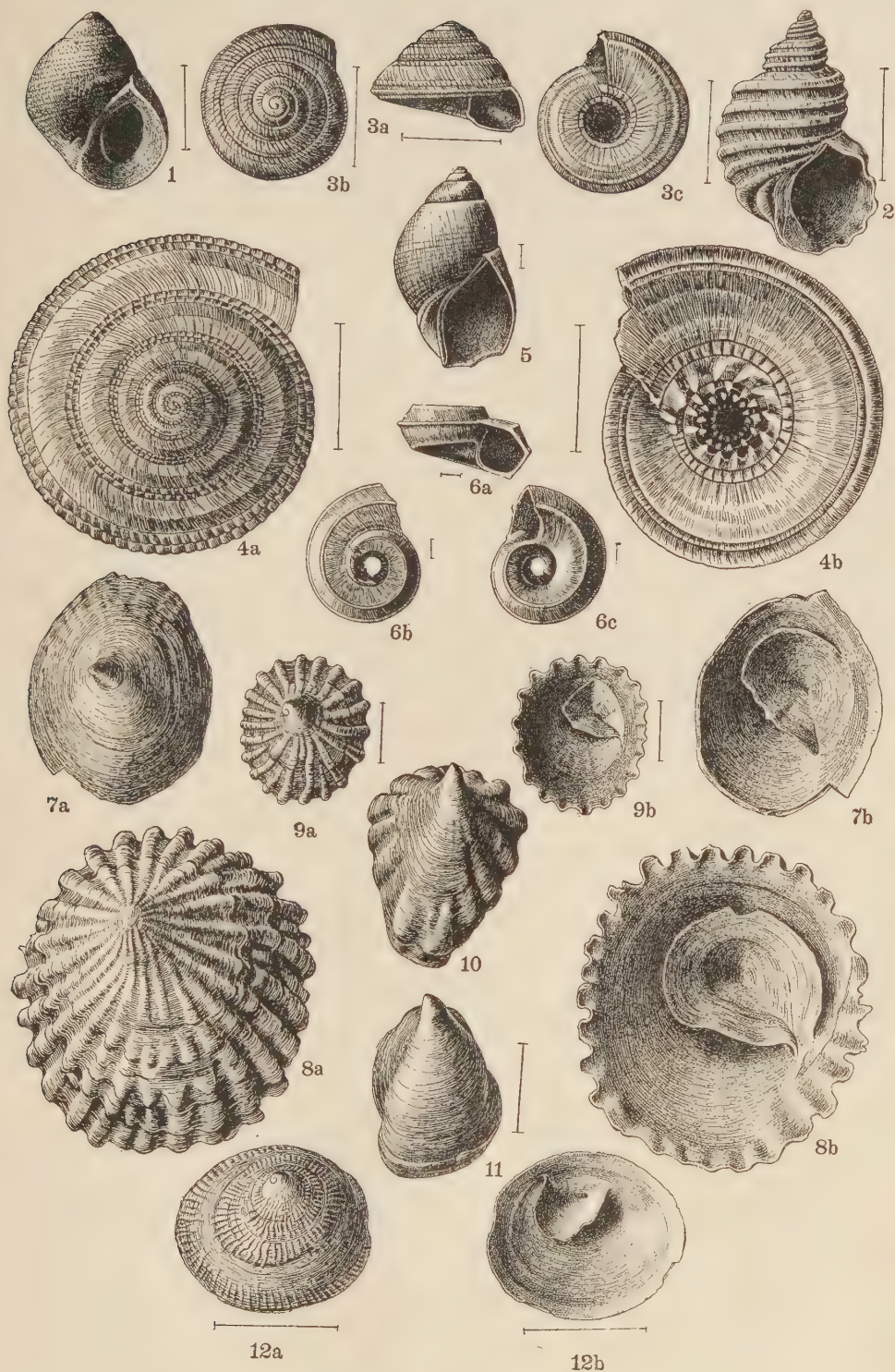


MOLLUSCA—GASTROPODA,

# PLATE LVIII.

|                                                                              | PAGE |
|------------------------------------------------------------------------------|------|
| Fig. 1. <i>LITTORINA IRRORATA</i> (Say) .....                                | 240  |
| 1. Ventral view. Choptank River. U. S. National Museum.                      |      |
| Fig. 2. <i>FOSSARUS (ISIPIS) DALLI</i> (Whitfield) .....                     | 240  |
| 2. Ventral view. Plum Point.                                                 |      |
| Figs. 3a-3c. <i>SOLARIUM TRILINEATUM</i> Conrad .....                        | 241  |
| 3a. Profile of specimen from Plum Point.                                     |      |
| 3b. Upper view of same specimen.                                             |      |
| 3c. Lower view of same specimen.                                             |      |
| Figs. 4a, 4b. <i>SOLARIUM AMPHITERUM</i> Dall .....                          | 242  |
| 4a. Upper view. Greensboro. U. S. National Museum. (After Dall.)             |      |
| 4b. Lower view of same specimen. (After Dall.)                               |      |
| Fig. 5. <i>RISSEA (ONOA) MARYLANDICA</i> n. sp. ....                         | 243  |
| 5. Ventral view. Cove Point.                                                 |      |
| Figs. 6a-6c. <i>ADEORBIS SUPRANITIDUS</i> S. Wood. ....                      | 243  |
| 6a. Profile view. St. Mary's River. Wagner Free Institute of Science.        |      |
| 6b. Upper view of the same specimen.                                         |      |
| 6c. Lower view of the same specimen.                                         |      |
| Figs. 7a, 7b. <i>CRUCIBULUM COSTATUM</i> (Say) .....                         | 244  |
| 7a. Dorsal view. Plum Point.                                                 |      |
| 7b. Ventral view of the same specimen.                                       |      |
| Figs. 8-10. <i>CRUCIBULUM COSTATUM</i> var. <i>PILEOLUM</i> (H. C. Lea)..... | 245  |
| 8a. Dorsal view. St. Mary's River.                                           |      |
| 8b. Ventral view of the same specimen.                                       |      |
| 9a. Dorsal view of young individual. St. Mary's River.                       |      |
| 9b. Ventral view of the same specimen.                                       |      |
| 10. Dorsal view of another specimen. Same locality.                          |      |
| Fig. 11. <i>CRUCIBULUM CONSTRICTUM</i> Conrad .....                          | 246  |
| 11. Dorsal view. St. Mary's River.                                           |      |
| Figs. 12a, 12b. <i>CRUCIBULUM MULTILINEATUM</i> Conrad .....                 | 246  |
| 12a. Dorsal view. Jones Wharf.                                               |      |
| 12b. Ventral view of the same specimen.                                      |      |

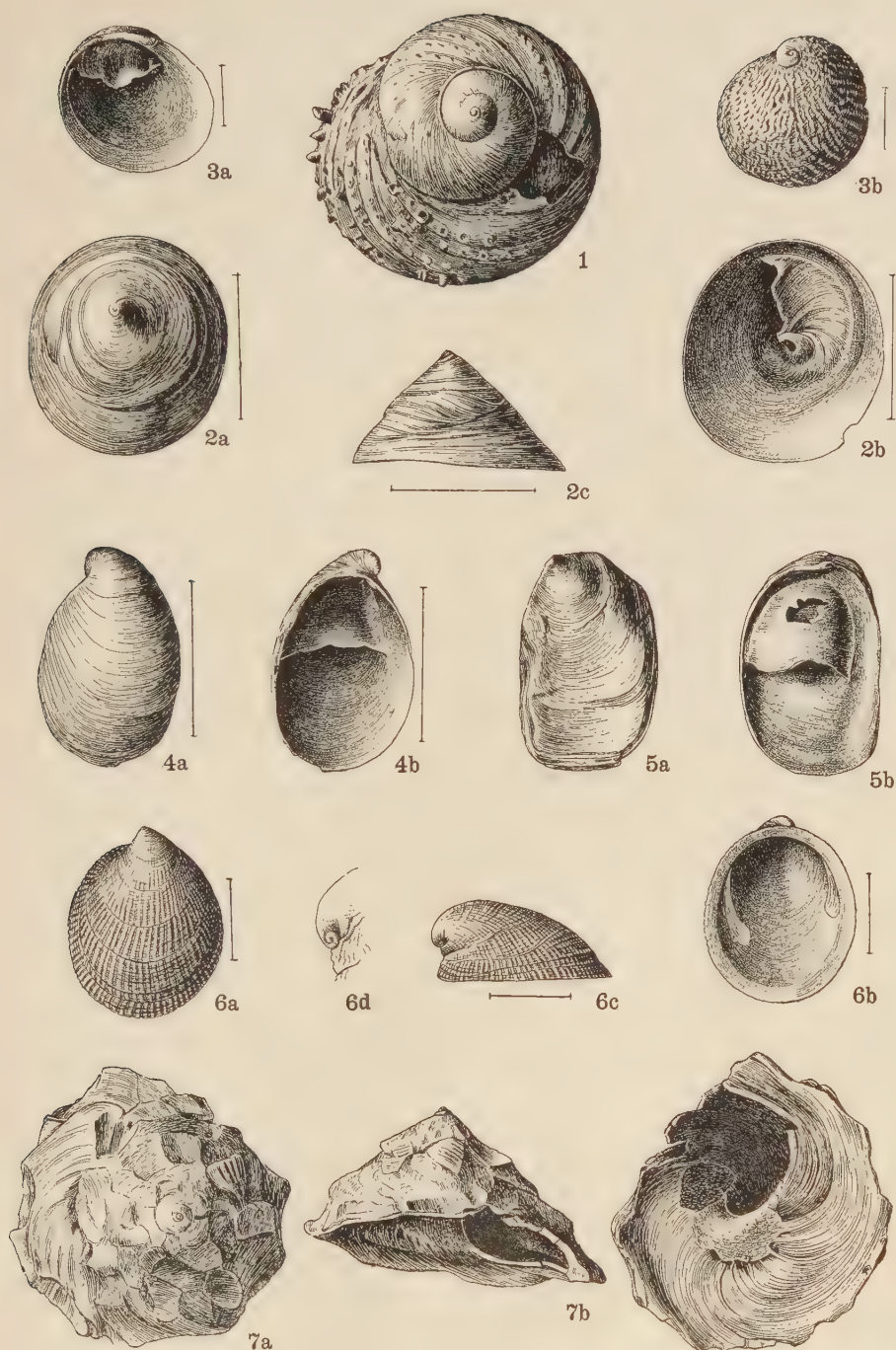






# PLATE LIX.

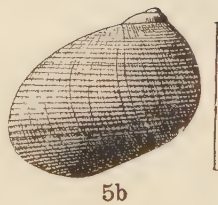
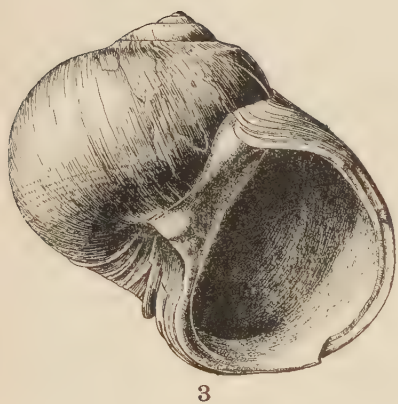
|                                                                                               | PAGE |
|-----------------------------------------------------------------------------------------------|------|
| Fig. 1. <i>CALYPTREA APERTA</i> (Solander) .....                                              | 247  |
| 1. Dorsal view. Plum Point.                                                                   |      |
| Figs. 2a-2c. <i>CALYPTREA CENTRALIS</i> (Conrad) .....                                        | 248  |
| 2a. Dorsal view. St. Mary's River.                                                            |      |
| 2b. Ventral view of the same specimen.                                                        |      |
| 2c. Lateral view of the same specimen.                                                        |      |
| Figs. 3a, 3b. <i>CALYPTREA GREENSBOROËNSIS</i> n. sp. ....                                    | 248  |
| 3a. Interior of specimen from Greensboro.                                                     |      |
| 3b. Exterior of the same specimen.                                                            |      |
| Figs. 4a, 4b. <i>CREPIDULA FORNICATA</i> (Linné) .....                                        | 249  |
| 4a. Exterior of specimen from Cove Point.                                                     |      |
| 4b. Interior of the same specimen.                                                            |      |
| Figs. 5a, 5b. <i>CREPIDULA PLANA</i> Say .....                                                | 250  |
| 5a. Exterior of specimen from Plum Point.                                                     |      |
| 5b. Interior of the same specimen.                                                            |      |
| Figs. 6a-6d. <i>AMALTHEA MARYLANDICA</i> n. sp. ....                                          | 251  |
| 6a. Exterior of a specimen from Greensboro.                                                   |      |
| 6b. Interior of the same specimen (muscular scars drawn from a<br>specimen from Jones Wharf). |      |
| 6c. Lateral view of the same specimen.                                                        |      |
| 6d. Beak of the same specimen, much enlarged.                                                 |      |
| Figs. 7a-7c. <i>XENOPHORA CONCHYLIOPHORA</i> (Born) .....                                     | 251  |
| 7a. Exterior of a specimen from Plum Point.                                                   |      |
| 7b. Interior of the same specimen.                                                            |      |
| 7c. Lateral view of the same specimen.                                                        |      |



MOLLUSCA—GASTROPODA.

PLATE LX.

|                                                      | PAGE |
|------------------------------------------------------|------|
| Fig. 1. POLYNICES (NEVERITA) DUPLICATUS (Say) .....  | 252  |
| 1. Ventral view. St. Mary's River.                   |      |
| Fig. 2. POLYNICES (LUNATIA) HEMICRYPTUS (Gabb) ..... | 252  |
| 2. Ventral view. Jones Wharf.                        |      |
| Figs. 3, 4. POLYNICES (LUNATIA) HEROS (Say).....     | 253  |
| 3. Ventral view. Jones Wharf.                        |      |
| 4. Ventral view. St. Mary's River.                   |      |
| Figs. 5a, 5b. SIGARETUS FRAGILIS Conrad .....        | 255  |
| 5a. Ventral view. Plum Point.                        |      |
| 5b. Dorsal view of the same specimen.                |      |

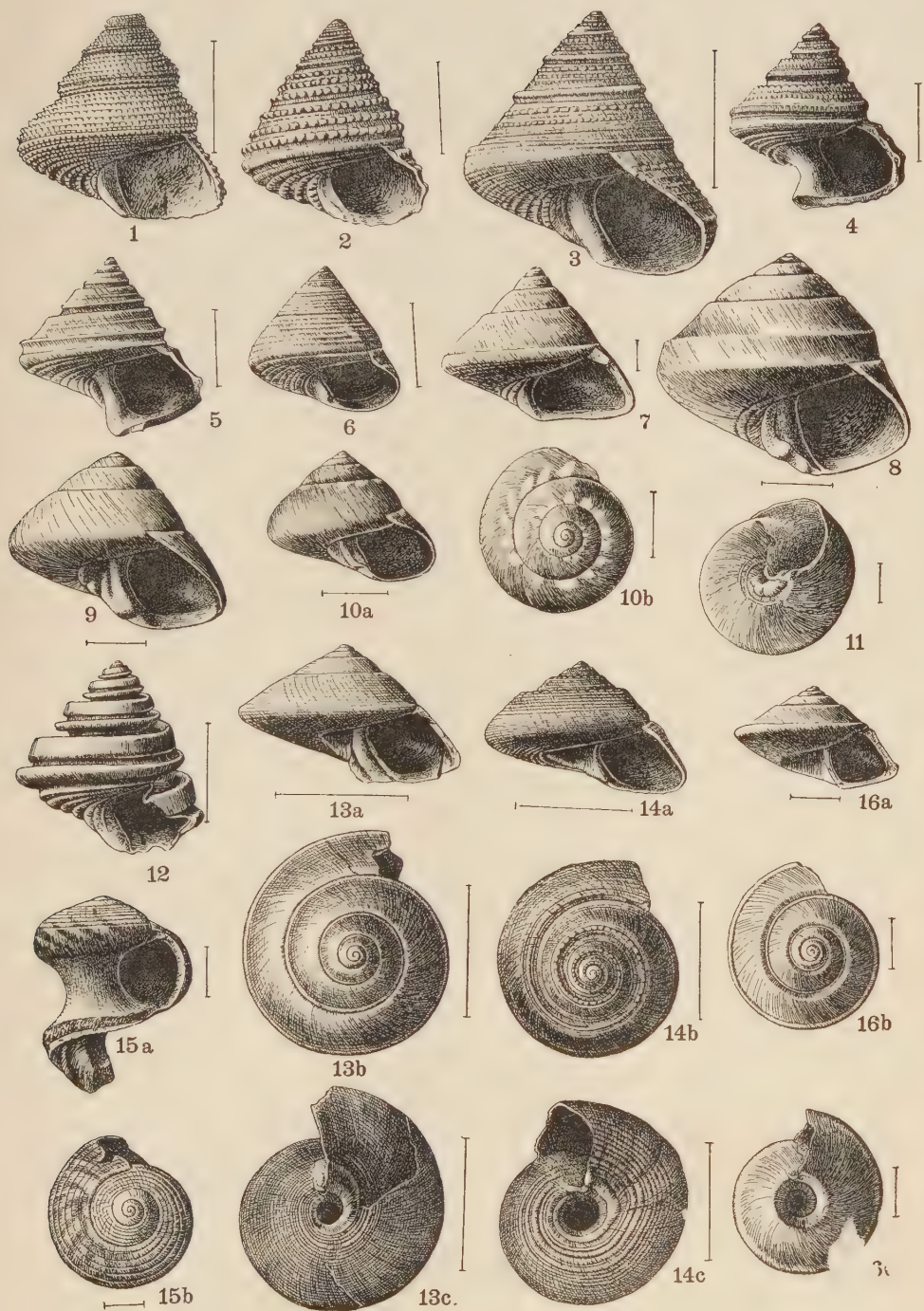


MOLLUSCA—GASTROPODA.

# PLATE LXI.

|                                                                         | PAGE |
|-------------------------------------------------------------------------|------|
| Fig. 1. <i>CALLIOSTOMA BELLUM</i> (Conrad) .....                        | 256  |
| 1. Ventral view. Miocene of Maryland. Wagner Free Institute of Science. |      |
| Figs. 2, 3. <i>CALLIOSTOMA PHILANTHROPUS</i> (Conrad) .....             | 256  |
| 2. Ventral view. 2 miles south of Governor Run.                         |      |
| 3. Ventral view of typical form. U. S. National Museum. (After Dall.)   |      |
| Fig. 4. <i>CALLIOSTOMA PHILANTHROPUS</i> var. ....                      | 257  |
| 4. Ventral view. Jones Wharf.                                           |      |
| Fig. 5. <i>CALLIOSTOMA VIRGINICUM</i> (Conrad) .....                    | 257  |
| 5. Ventral view. Miocene of Maryland. Wagner Free Institute of Science. |      |
| Fig. 6. <i>CALLIOSTOMA DISTANS</i> (Conrad) .....                       | 258  |
| 6. Ventral view. St. Mary's River.                                      |      |
| Fig. 7. <i>CALLIOSTOMA EBOREUM</i> (Wagner) .....                       | 259  |
| 7. Ventral view. Reed's.                                                |      |
| Fig. 8. <i>CALLIOSTOMA WAGNERI</i> Dall .....                           | 260  |
| 8. Ventral view. Greensboro. U. S. National Museum. (After Dall.)       |      |
| Figs. 9-11. <i>CALLIOSTOMA APHELIUM</i> Dall. ....                      | 260  |
| 9. Ventral view. Jones Wharf. U. S. National Museum. (After Dall.)      |      |
| 10a. Profile of specimen from Jones Wharf.                              |      |
| 10b. Same specimen seen from above.                                     |      |
| 11. Specimen seen from below. Cordova.                                  |      |
| Fig. 12. <i>CALLIOSTOMA PERALVEATUM</i> (Conrad) .....                  | 261  |
| 12. Ventral view. Plum Point.                                           |      |
| Figs. 13a-13c. <i>CALLIOSTOMA HUMILE</i> (Conrad) .....                 | 261  |
| 13a. Profile of specimen from St. Mary's River.                         |      |
| 13b. Upper view of same specimen.                                       |      |
| 13c. Lower view of the same specimen.                                   |      |
| Figs. 14a-14c. <i>CALLIOSTOMA RECLUSUM</i> (Conrad) .....               | 262  |
| 14a. Profile of specimen from St. Mary's River.                         |      |
| 14b. Upper view of same specimen.                                       |      |
| 14c. Lower view of same specimen.                                       |      |
| Figs. 15a, 15b. <i>CALLIOSTOMA MARYLANDICUM</i> n. sp. ....             | 263  |
| 15a. Profile of specimen from Plum Point. U. S. National Museum.        |      |
| 15b. Same specimen as seen from above.                                  |      |
| Figs. 16a-16c. <i>CALLIOSTOMA CALVERTANUM</i> n. sp. ....               | 263  |
| 16a. Profile of specimen from Plum Point.                               |      |
| 16b. Same specimen as seen from above.                                  |      |
| 16c. Same specimen as seen from below.                                  |      |





# PLATE LXII.

|                                                                    | PAGE |
|--------------------------------------------------------------------|------|
| Figs. 1, 2. <i>TEINOSTOMA NANUM</i> (Lea) .....                    | 263  |
| 1a. Profile of specimen from Cove Point.                           |      |
| 1b. Same specimen as seen from above.                              |      |
| 1c. Same specimen as seen from below.                              |      |
| 2a. Profile of specimen from St. Mary's River.                     |      |
| 2b. Same specimen as seen from above.                              |      |
| 2c. Same specimen as seen from below.                              |      |
| Figs. 3a-3c. <i>TEINOSTOMA CALVERTENSE</i> n. sp. ....             | 264  |
| 3a. Profile of specimen from Plum Point.                           |      |
| 3b. Upper view of the same specimen.                               |      |
| 3c. Lower view of the same specimen.                               |      |
| Figs. 4a-4c. <i>TEINOSTOMA LIPARUM</i> (H. C. Lea).....            | 264  |
| 4a. Profile of specimen from St. Mary's River.                     |      |
| 4b. Upper view of the same specimen.                               |      |
| 4c. Lower view of the same specimen.                               |      |
| Figs. 5a-5c. <i>TEINOSTOMA GREENSBOROËNSE</i> n. sp. ....          | 265  |
| 5a. Profile of specimen from Greensboro.                           |      |
| 5b. Upper view of the same specimen.                               |      |
| 5c. Lower view of the same specimen.                               |      |
| Figs. 6a-6c. <i>COCHILIOLEPIS STRIATA</i> Dall .....               | 265  |
| 6a. Profile of specimen from Plum Point. U. S. National Museum.    |      |
| 6b. Upper view of the same specimen.                               |      |
| 6c. Lower view of the same specimen.                               |      |
| Fig. 7. <i>MOLLERIA MINUSCULA</i> Dall .....                       | 266  |
| 7. View of type specimen. St. Mary's River. U. S. National Museum. |      |



1b



1a



1c



2c



2a



2b



3b



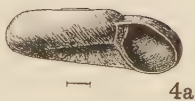
3a



3c



4c



4a



4b



5b



5a



5c



6c



6a



6b

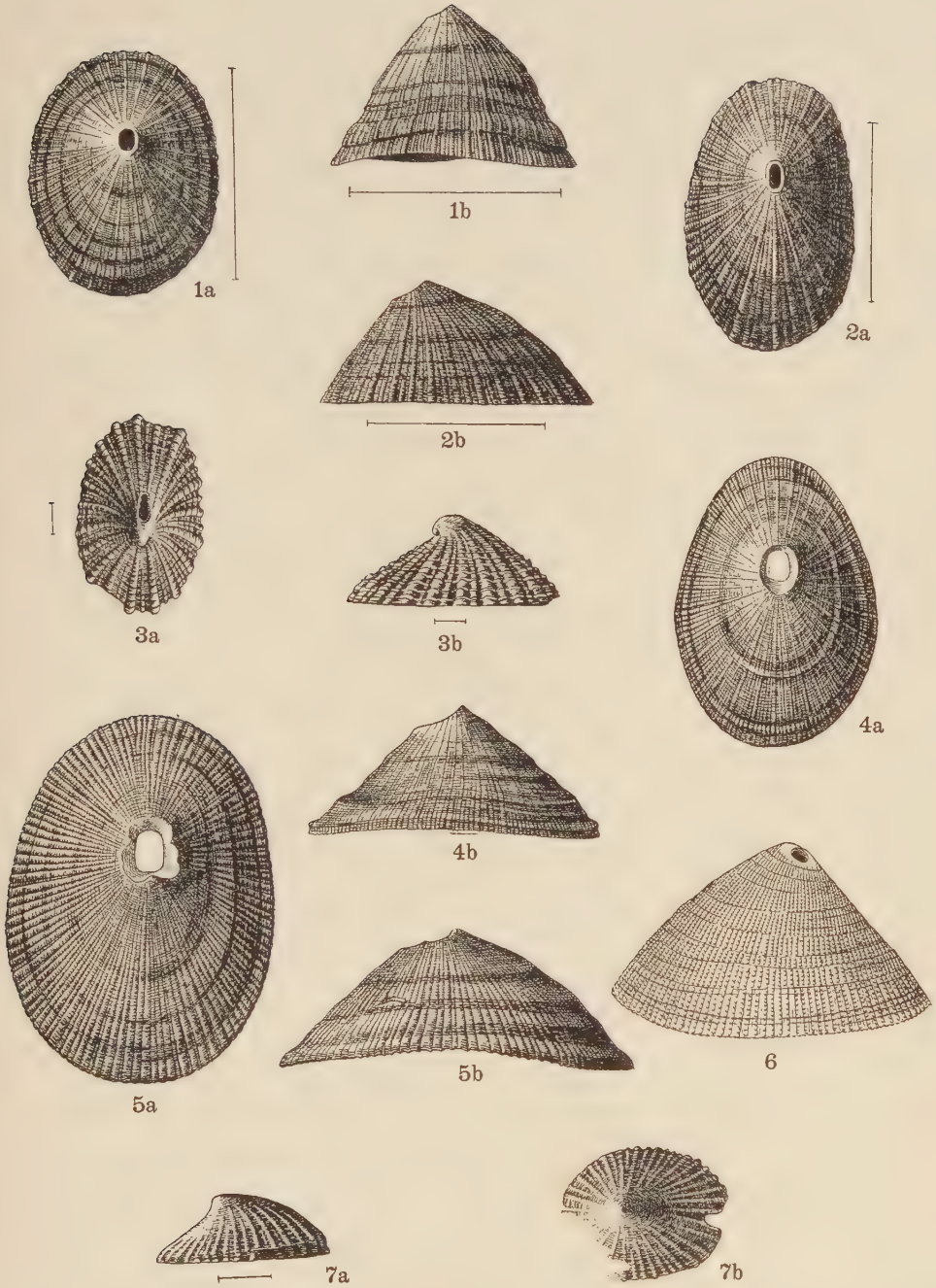


7

# PLATE LXIII.

|                                                                                  | PAGE |
|----------------------------------------------------------------------------------|------|
| Figs. 1a, 1b. <i>FISSURIDEA ALTICOSTA</i> (Conrad) .....                         | 266  |
| 1a. Dorsal view. St. Mary's River. Wagner Free Institute of Science.             |      |
| 1b. Lateral view of the same specimen.                                           |      |
| Figs. 2, 3. <i>FISSURIDEA GRISCOMI</i> (Conrad) .....                            | 267  |
| 2a. Dorsal view. Church Hill.                                                    |      |
| 2b. Lateral view of the same specimen.                                           |      |
| 3a. Dorsal view of young individual. Same locality.                              |      |
| 3b. Lateral view of the same specimen.                                           |      |
| Figs. 4a, 4b. <i>FISSURIDEA MARYLANDICA</i> (Conrad) .....                       | 268  |
| 4a. Dorsal view. Plum Point.                                                     |      |
| 4b. Lateral view of the same specimen.                                           |      |
| Figs. 5a, 5b. <i>FISSURIDEA NASSULA</i> (Conrad) .....                           | 268  |
| 5a. Dorsal view. Jones Wharf.                                                    |      |
| 5b. Lateral view of the same specimen.                                           |      |
| Fig. 6. <i>FISSURIDEA REDIMICULA</i> (Say) .....                                 | 269  |
| 6. Lateral view of type specimen. St. Mary's River. British Museum. (After Say.) |      |
| Figs. 7a, 7b. <i>EMARGINULA MARYLANDICA</i> n. sp. ....                          | 269  |
| 7a. Lateral view. Greensboro.                                                    |      |
| 7b. Dorsal view of the same specimen.                                            |      |



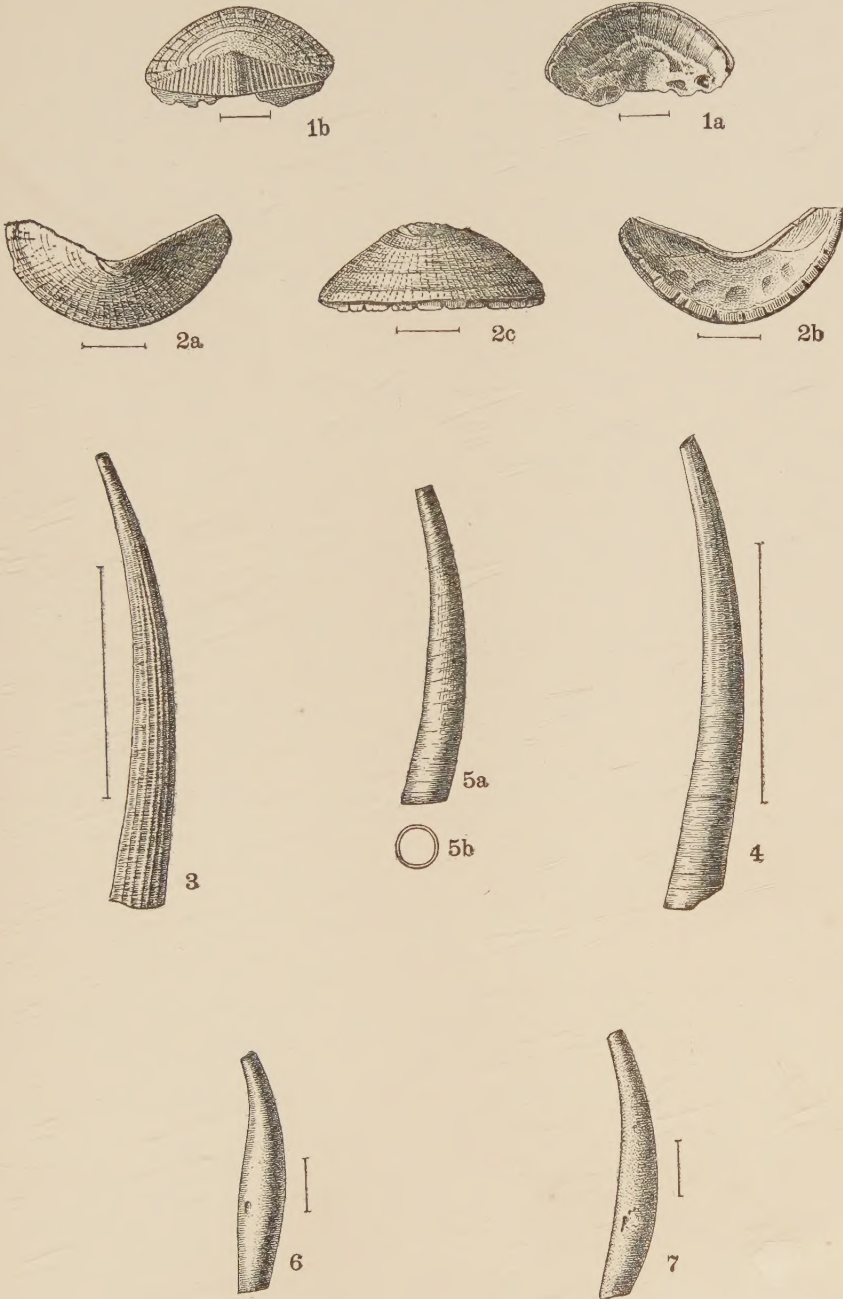


MOLLUSCA—GASTROPODA.



# PLATE LXIV.

|                                                                                  | PAGE |
|----------------------------------------------------------------------------------|------|
| Figs. 1, 2. CHÆTOPLEURA APICULATA (Say) .....                                    | 270  |
| 1a. Ventral view of posterior valve. 3 miles south of Chesapeake Beach.          |      |
| 1b. Dorsal view of the same specimen.                                            |      |
| 2a. Dorsal view of anterior valve. Plum Point. U. S. National Museum.            |      |
| 2b. Ventral view of the same specimen.                                           |      |
| 2c. Anterior view of the same specimen.                                          |      |
| Fig. 3. DENTALIUM ATTENUATUM Say.....                                            | 271  |
| 3. Specimen from St. Mary's River.                                               |      |
| Fig. 4. DENTALIUM DANAI Meyer .....                                              | 272  |
| 4. Specimen from Plum Point.                                                     |      |
| Figs. 5a, 5b. DENTALIUM CADULOIDE Dall .....                                     | 272  |
| 5a. View of specimen from St. Mary's River. U. S. National Museum. (After Dall.) |      |
| 5b. View of aperture of the same specimen. (After Dall.)                         |      |
| Fig. 6. CADULUS THALLUS (Conrad) .....                                           | 273  |
| 6. Specimen from Plum Point.                                                     |      |
| Fig. 7. CADULUS NEWTONENSIS Meyer and Aldrich.....                               | 273  |
| 7. Specimen from Jones Wharf.                                                    |      |



MOLLUSCA—AMPHINEURA AND SCAPHOPODA.









